AMERICA'S LARGEST TEXTILE MONTHLY

COTTON

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Number Six
$1.00 a Year.

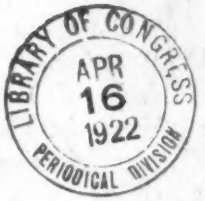
APRIL, 1922

Published monthly by
W. R. C. Smith Publishing Co.
Dalton, and Atlanta, Ga.

National

Naphthol AS

Rapid Fast Dyes for Cotton
when
Diazotized and Developed
with
National Red Developer P
National Blue Developer D
National Scarlet Developer O



National Aniline and Chemical Co., Inc.

New York
Boston
Chicago
Hartford
Charlotte

THE FIRST AND LARGEST MAKERS of COAL-TAR DYES IN AMERICA

Montreal
Toronto
Providence
Philadelphia
San Francisco

NATIONAL U.S.A. DYES

NATIONAL U.S.A. DYES

NATIONAL DYES

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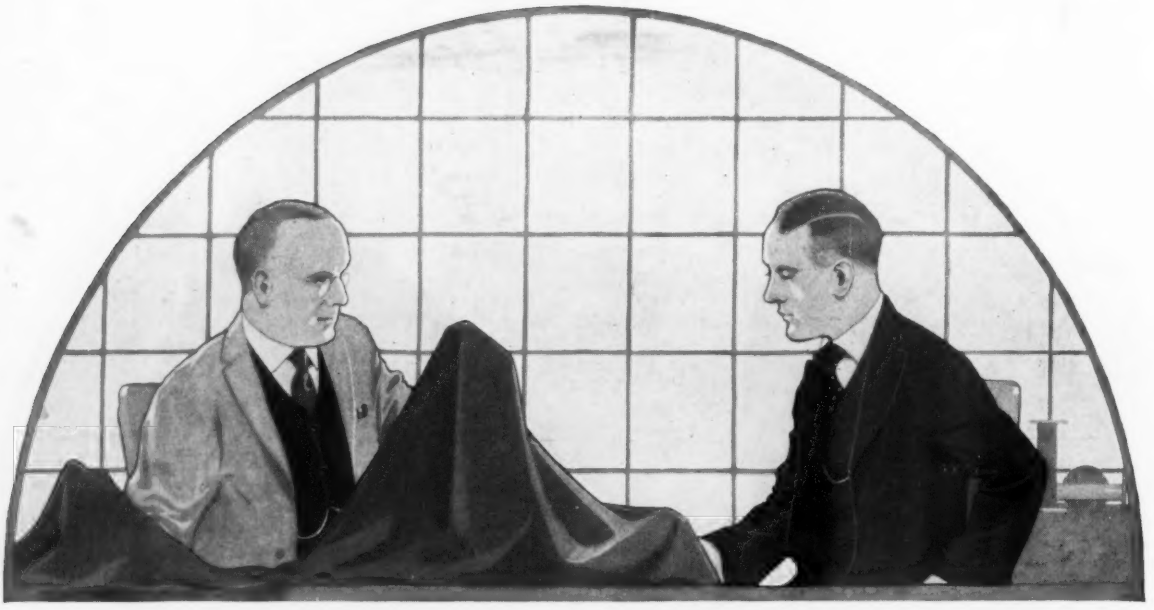
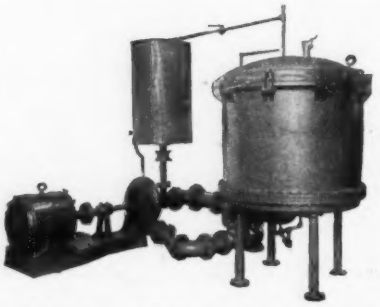


"No Goods Thrown Back on Us This Season Because of Uneven Dyeing"

THIS is the report of a worsted mill in Philadelphia that has been using 10,000 pounds of FRANKLIN dyed yarn per week during the past season. (The yarn is dyed on jackspools.) The remarkable thing about Franklin Package Dyeing Machines is that they not only make savings over other dyeing methods which will pay for them in a year's time or less, but they also turn out a very uniform product and produce unusually brilliant colors.



A FRANKLIN PACKAGE DYEING MACHINE

Franklin dyed goods build prestige for your name and strengthen the good will of your customers. If you have not enough work to justify the installation of a Franklin Dyeing Machine we can handle your dyeing on a contract basis. We have three of the most economical job dyeing houses in the world in Providence, Philadelphia and Greenville, S. C.

Franklin Package Dyeing is not an experiment. The best evidence that we can offer as to the satisfactory nature of our service is that we have many of the best known textile concerns in the country as our customers; also that in three years we have built up a job dyeing business from 8,000 to 25,000 lbs. per day.

If you wish the complete story of FRANKLIN Package Dyeing, we will be glad to have one of our technical experts call. It will cost you nothing and may lead to saving you considerable money in the course of a year. Just drop us a line.

FRANKLIN PROCESS

Philadelphia CO. Manchester, Eng.

PROVIDENCE, RHODE ISLAND, U.S.A.

New Plant in Greenville, S. C.

Job Dye Houses in All Four Cities

No. 32

MIRROR DROP WIRES

TRADE-MARK REG. U. S. PAT. OFF.

Having greatly improved the finish of our Northrop Loom Drop Wires

we have adopted the trade-mark

MIRROR

to identify the drop wires of our manufacture and each shipment will contain a slip bearing this trade-mark

Although our prices for drop wires are higher than others that may be purchased, the superior finish of our drop wires makes them worth much more than the difference in price

It does not pay to polish the eyes of drop wires with the warp yarns, after reaching the loom

It takes too long and warps are too expensive

DRAPER CORPORATION

HOPEDALE MASSACHUSETTS

Atlanta Georgia

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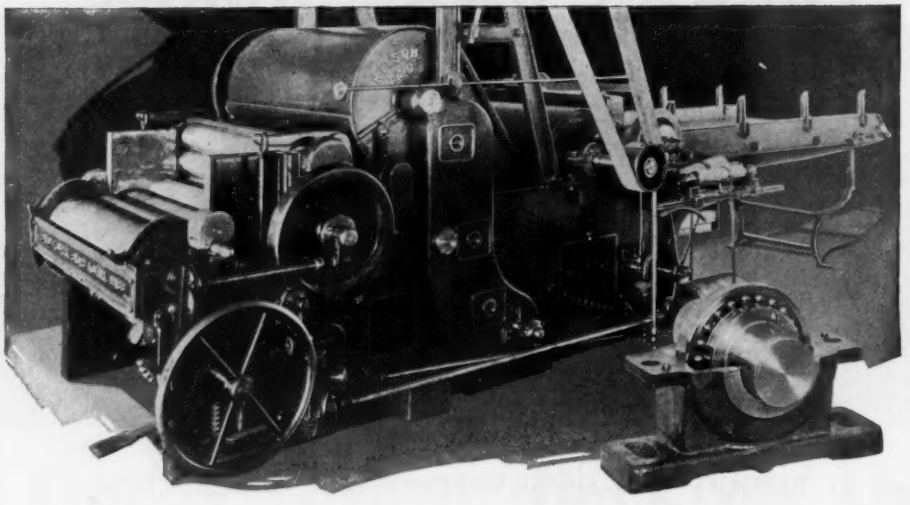
SKF



Why the Use of Self-Aligning Ball Bearings Produces a Better Lap

WHEN fan or beater speed in cotton openers and pickers varies—when friction in the bearings of the apron or evener rolls causes the belt to slip—the speed of one part of the machine will lag behind the rest and though the total weight of the lap *may* be correct the lap will *not* be uniform throughout.

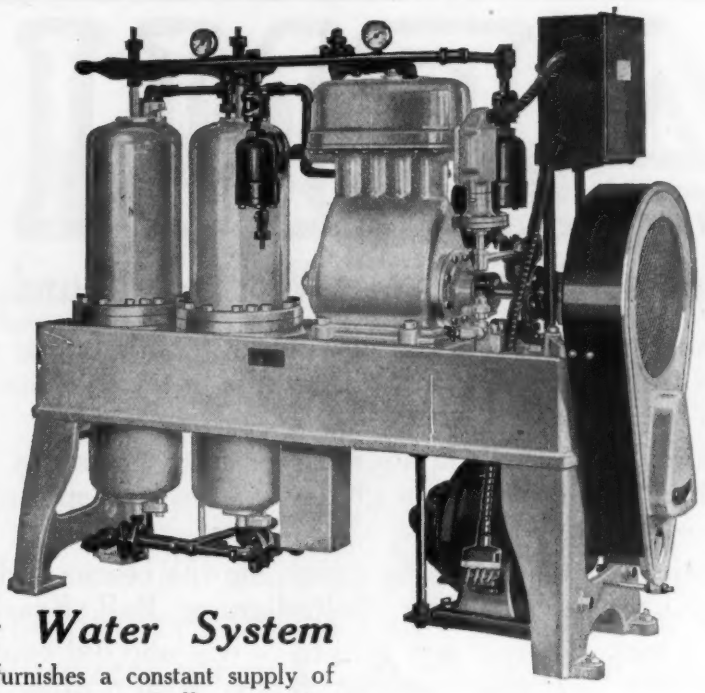
Self-aligning ball bearings marked **SKF** remove the drag caused by friction. And because they compensate automatically for any deflection or misalignment of the fan shaft, the apron roll, or the evener rolls they prevent the heating and binding which cause trouble in other types of bearings. They eliminate wear at the beater shaft, maintain a permanent setting and insure correct opening and cleaning. Their oil tight housings prevent any damage or discoloration to the stock and at the same time reduce lubrication costs 80%.

Practical mill men who have made comparative tests know that **SKF** marked ball bearings increase not only the efficiency of individual parts of the machine but the quantity and quality of output in the picker room as a whole.

THE SKAYEF BALL BEARING COMPANY

Supervised by SKF INDUSTRIES, INC., 165 Broadway, New York City

730



This Lipman Automatic creates cold equal to the melting of a constant size 4,000-pound cake of ice in 24 hours.

Drinking Water System

This machine furnishes a constant supply of sparkling cold water automatically—saves ice expense.

Protects Your Emyloyees and Your Pocketbook

You want frequent drinks of cold water while you work. What about your employees toiling in the hot, dusty factory? Can they get frequent, satisfying draughts of the world's greatest tonic? Or, do you compel them to drink from water tanks filled with insanitary ice blocks and always either too cold or lukewarm? That way isn't safe—disease germs lurk in ice—your workers' health is endangered. And, it costs you too much.

Far Cheaper Than Ice

Why pay big ice bills every month? Ice cools only half-heartedly. It takes up too much handling—to crush and distribute, to clean tanks, to watch the supply. It's much cheaper to use Lipman Automatic Refrigeration. By saving labor and cutting out ice bills a Lipman more than pays for itself, besides the dividends from healthier employees.

Absolutely Automatic

Just set the Lipman Automatic Refrigerating Machine at the desired temperature—then forget it. You can depend on a constant supply of fresh, pure, cold water. Makes ice, too. Many other novel uses. Temperature is automatically kept within limits of 1½ degrees. Requires little current. Operating cost unusually small.

Permanent Satisfaction Guaranteed

Hundreds of Lipman Automatics are giving satisfaction. Your money back if you're not satisfied. Send for a list of prominent users near you and let us send a Refrigerating Engineer to investigate your particular problem. He'll give you a surprisingly low quotation. It costs you nothing to investigate—if we can't save you money we won't sell you a Lipman!

MILES REFRIGERATING COMPANY

292 Peachtree Street Dept. H-2 Atlanta, Ga.

Lipman

FULL-AUTOMATIC REFRIGERATING MACHINES

FAFNIR

An Ounce of Preventive is Worth a Pound of Cure

In other words, it is infinitely better to take steps to prevent your goods from becoming soiled than it is to try to clean the cotton after it has been smeared with oil.

You know that there is a strong tendency for oil to leak out of plain bearings and collect in a greasy wad which spatters oil over the cotton on the cylinder.

You can prevent all this by equipping the beater and fan shafts of your pickers with **Fafnir Self-aligning Ball Bearing Boxes** which can't leak. It will pay you to do it,—and did you know that you can replace your plain bearing boxes with Fafnir equipment without alterations?

THE FAFNIR BEARING COMPANY

Conrad Patent Licensee

DETROIT Office: 752 David Whitney Bldg.
CLEVELAND Office: 1016-1017 Swetland Bldg.

New Britain, Conn.

CHICAGO Office: 537 So. Dearborn St.
NEW YORK OFFICE: 5 Columbus Circle

Southern Representative,
O. R. S. Pool, P. O. Box 1375, Greenville, S. C.

STAFFORD

AUTOMATIC LOOMS

For Wide Sheetings

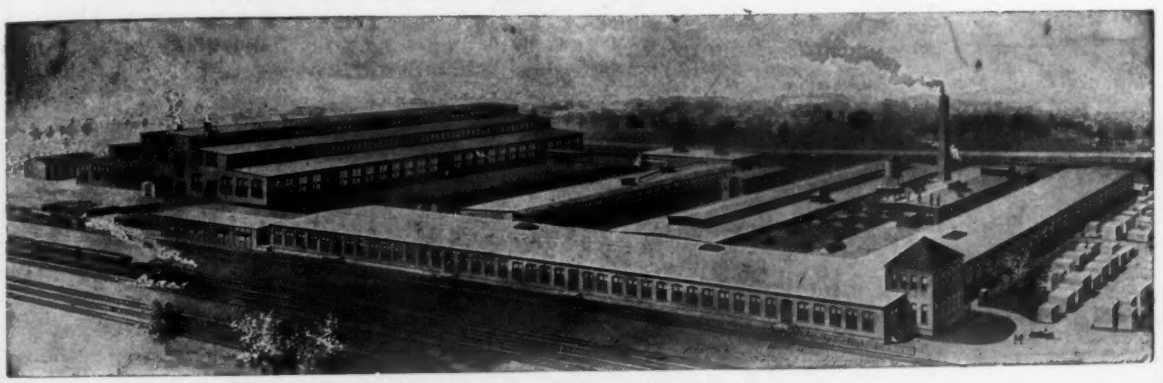
The Stafford broad loom is built to withstand severe service. Its simplicity, accessibility of parts and ease of operation are a few reasons why it is used by some of the most representative wide goods mills.

This loom embodies the high weaving qualities that characterize other Stafford looms and it can now be supplied with either shuttle or bobbin changing automatic features.

THE STAFFORD COMPANY

READVILLE, MASS.

Southern Agent, J. H. MAYES, Charlotte, N. C.



PLANT OF THE STAFFORD COMPANY, READVILLE, MASS.

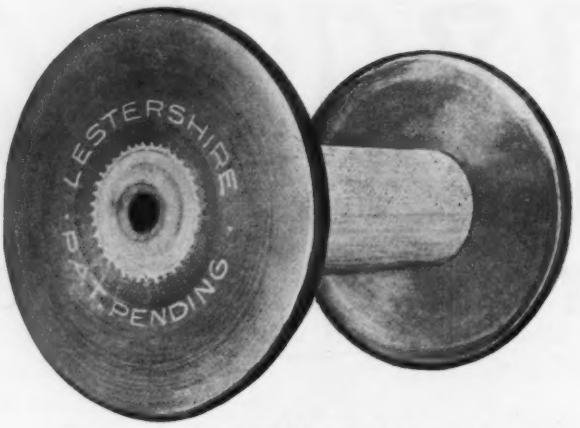


FIG. 2. LESTERSHIRE FIBRE HEAD SPOOL

"The Everlasting Spool"

The "Lestershire Type" Patented Vulcanized Fibre Head Spools are acknowledged by those who have used them, to be the most practical and economical spools on the market for regular mill use.

A knowledge of the construction will convince you that this spool has been designed to give the greatest satisfaction for whatever purpose it is used.

"Lestershire Type"' Spool Heads are made from vulcanized hard fibre (the material from which such articles as gears and end thrust bearings are made). This is flexible enough to bend under strain; practically unbreakable, never warps or twists out of shape, yet so hard that the best tool steel will not readily machine it. Diamond pointed tools are used.

The heads are held securely in position with dogwood bushings and are locked in the barrel so that they cannot burn. This method of securing the heads is the patented feature of all "Lestershire Type" Spools.

By actual tests, these spools will increase your creeling production at least 50% over any other type spool.

The dogwood bushings used make the spindle bearings last many times longer than ordinary wood bushings.

Vulcanized fibre spools are not new. In the silk industry where they have been in use for fully twenty years, practically no other type is used for the reason that this kind of fibre is almost unbreakable and will not wear rough.

With our improved method of fastening the heads to the barrel, it is just as applicable in other branches of the textile industry.

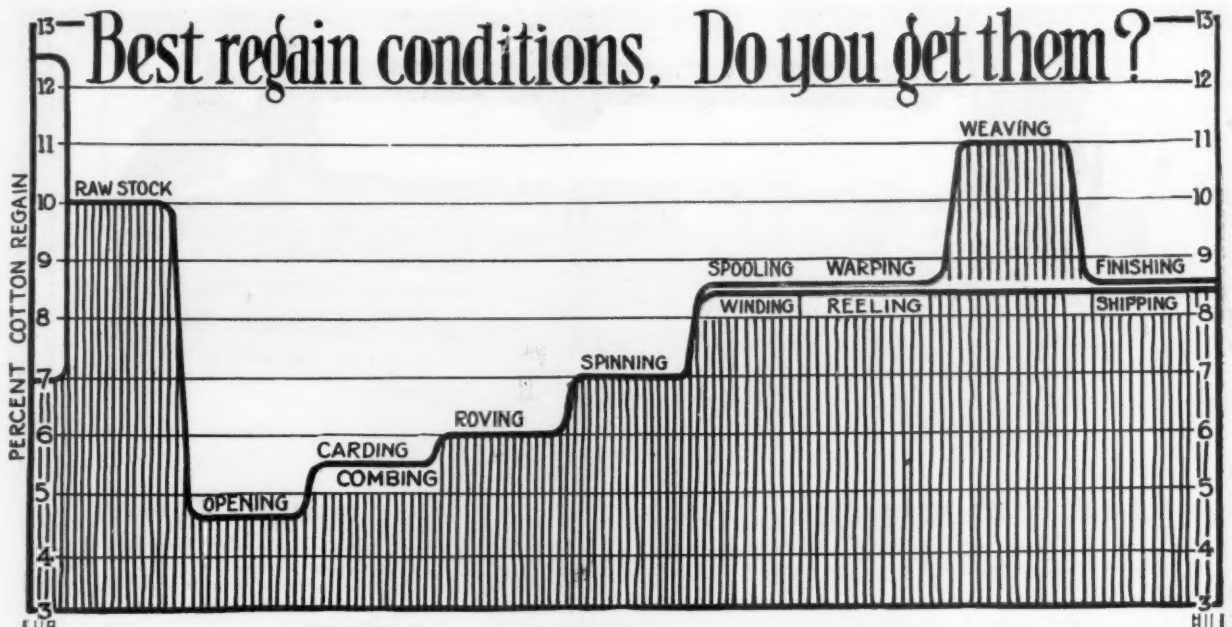
This is why **"Lestershire Everlasting"** spools are recognized as more than mere supplies that are soon worn out and thrown away. The up-to-date mill man knows that their long life makes them **permanent fixtures** of the mill.

Mail us a sample of your spool and we will quote price for duplicating same in our Patented Everlasting Fibre Spool.

Lestershire Spool & Mfg. Co.

Johnson City, N. Y.

Manufacturers of Spools and Bobbins of Every Description



Thirsty Cotton and What It Costs You

Cotton comes to you containing a certain amount of moisture. You paid for it as cotton. From seven to twelve percent of it was water. Whatever you shrink in water—you make up in cotton. Do you know how much?

Look at the chart. In the very first process—opening—most of the moisture is lost. The cotton actually becomes thirsty.

Humidifiers put this moisture back. This must be done gradually—step by step. Finally in your yarn or your cloth—the loss may be made up—Regained.

ParkSpray humidifiers accomplish this if installed and operated as we recommend. Look at the chart again. Results less than these come out of your profits.

Look at the right hand side of the chart. This shows what the moisture content should be in the last step of manufacture. The goods are made. They are ready to ship.

Suppose your regain at this point is down to 4 percent; it frequently is in some plants even with humidifiers. Let us figure out what you lose by not having ample humidifier capacity, automatic regulation, and a scientific approach to your definite problem. With cotton at

15c you lose $3.08 on each bale
20c " " 4.12 " " "
25c " " 5.16 " " "

These losses are figured at the prices of your raw material—not on the selling prices of your finished article. These losses are figured on your raw material shrink. They do not take into account the manufacturing losses and perplexities that accompany.

You may buy humidifiers on price only. Thirsty cotton costs you more than you save in so doing.

There is just the right amount of moisture needed for each manufacturing operation—for you. There is just the right way to determine what this is. We would rather you would have the right equipment at a fair price than inadequate equipment at any price.

Would you be interested to find out what "moisture content" losses you now have—and how to prevent them?

Write for Bulletin No. 1921.

Parks-Cramer Company

Engineers & Contractors

Industrial Piping and Air Conditioning

Fitchburg Boston Charlotte

The statements above, with changed figures would apply to paper, tobacco, silk, wool and worsted.

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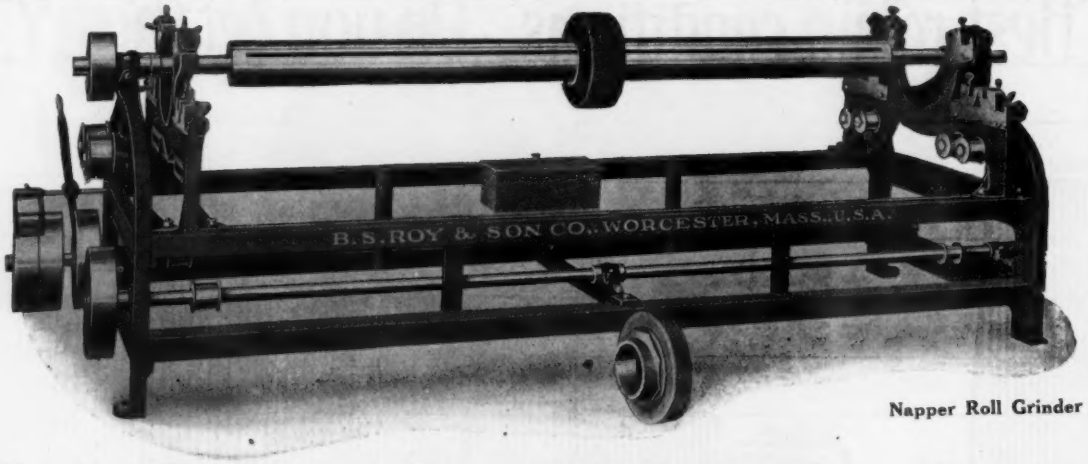


Napper Roll Grinder

Don't Mortgage Your Mills' Earning Power

Not to install Roy Grinders to keep certain machines in top-notch condition is to place a mortgage on the earning power of the mill itself.

To install ordinary grinding machinery as a makeshift merely postpones the day when Roy Equipment must be used.

For those who are prone to consider foreign built machinery superior to home production we suggest that they ask the American mills, who in the old days used foreign types of grinders, why they are so enthusiastic over Roy machines.

Roy Grinders are the common attribute of all progressive mills.

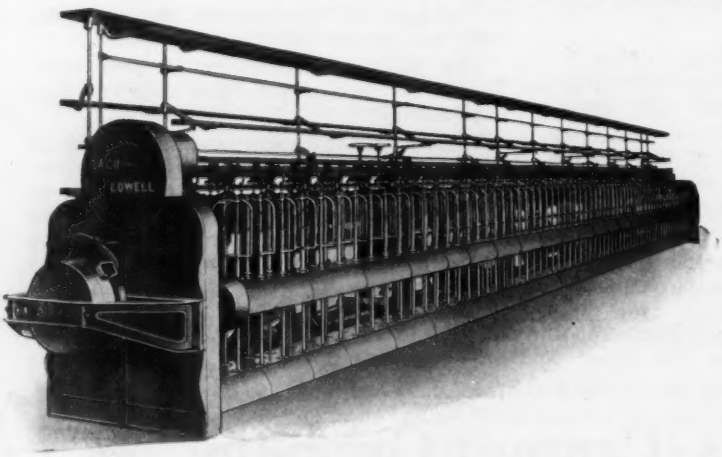
B. S. Roy & Son Co., Worcester, Mass.

ESTABLISHED 1868

E. M. TERRYBERRY, *Southern Agent*
1126 Healey Bldg., Atlanta, Ga.

Canadian Representative
W. J. WESTAWAY CO., LTD.,
Hamilton, Ontario

SACO-LOWELL SHOPS
TEXTILE MACHINERY



Our Improved Roving Frames are economical to operate and give satisfactory service.

Slubbers, Intermediates, Fine Frames and Jacks for all counts of roving. Catalog on request.

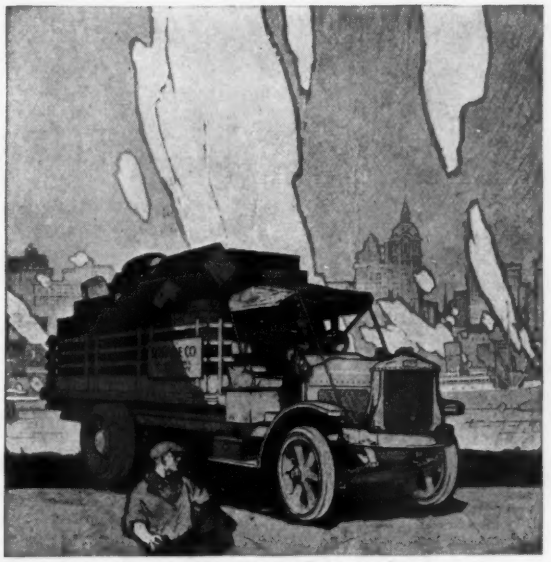
EXECUTIVE OFFICES, 77 FRANKLIN STREET, BOSTON, MASS.

SHOPS AT

LOWELL, MASS. NEWTON UPPER FALLS, MASS. BIDDEFORD, MAINE.

ROGERS W. DAVIS, SOUTHERN AGENT, CHARLOTTE, N. C.

SOUTHERN BRANCH OFFICE, GREENVILLE, S. C.



White Trucks

Fifteen owners alone have invested more than $20,000,000 in White Trucks

5-ton	$4,500
3½-ton	4,200
2-ton	3,250
¾-ton	2,400

F. O. B. Factory

THE WHITE COMPANY

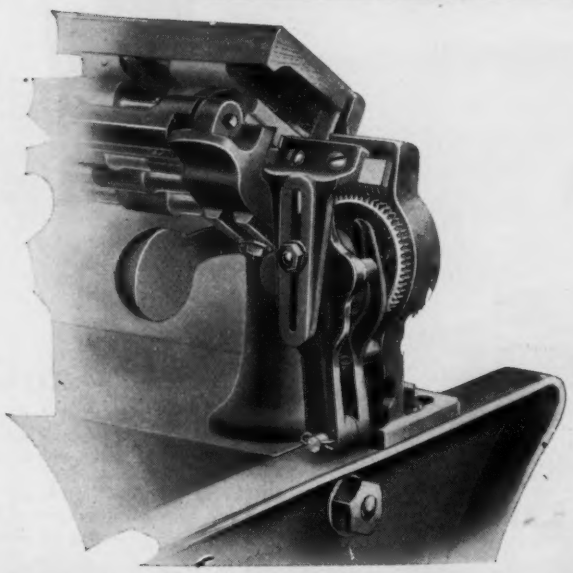
Cleveland

21 YEARS OF KNOWING HOW

WHITIN MACHINE WORKS

ESTABLISHED 1831

TEXTILE MACHINERY



The Efficiency and Durability

of

LEATHER TOP-ROLLS

are increased by the use of the

WHITIN

VARIABLE TRAVERSE MOTION

All Whitin Ring Spinning Frames are equipped with this device.

MAIN OFFICE AND WORKS

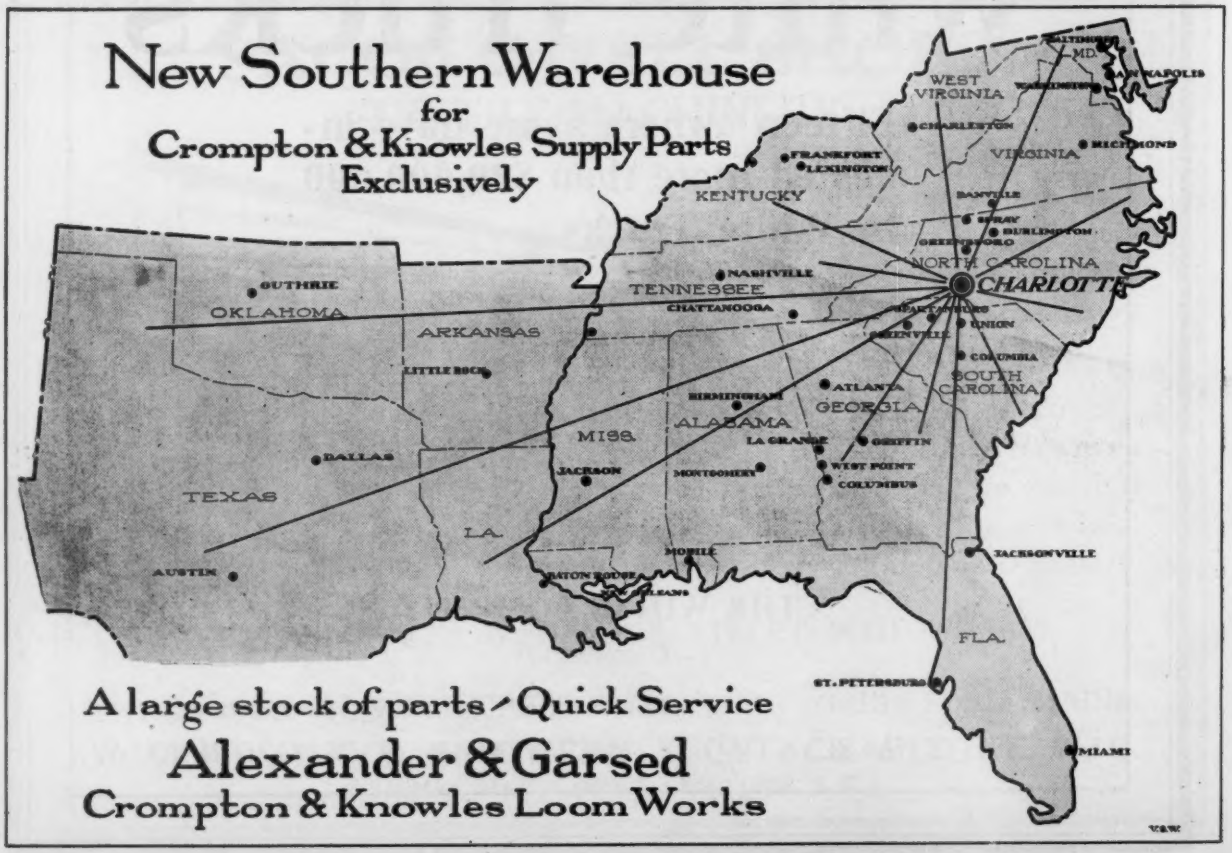
WHITINSVILLE, MASS., U.S.A.

SOUTHERN OFFICE CHARLOTTE N.C.

New Southern Warehouse

for

Crompton & Knowles Supply Parts Exclusively



A large stock of parts - Quick Service

Alexander & Garsed

Crompton & Knowles Loom Works

A Great Truck Value

You will be greatly surprised to find how little more it takes to buy a Packard Truck than to get just an ordinary truck.

In many cases, the first cost of a Packard is actually lower than that of others, and in all cases its final cost is much lower.

Its certainty of performance, its economy of upkeep, and its security as an investment, all combine to make the Packard Truck at its present price the greatest value in the motor truck market today.

It is the product of a company that is known for stability and experience. Prompt service at the fairest of prices for labor and parts is available on it everywhere, through nation-wide Packard facilities.

In its daily operation, the Packard requires a minimum of routine care, and it always returns a maximum of powerful, dependable service.

It is a thoroughbred in design, materials, and workmanship. Its quality is the rugged quality essential for long life, freedom from trouble, and low-cost operation.

Have your Packard dealer quote you the figure at which the Packard Truck is selling today. He is ready to advise with you also on any special or body equipment you may require for the economical handling and hauling of your products.

In more than two hundred lines of business, Packard Trucks are relied on today for better hauling at lower cost.

Packard Trucks range in capacity from 2 to 7½ tons, and in price from $3,100 to $4,500, at Detroit

PACKARD

ASK THE MAN WHO OWNS ONE

Lower Prices
through
Wise Buying

NOT by dickering and bargaining, not through a "buyers' strike," not by fanning the fires of ruthless competition—these are but shallow expedients without permanent value.

There is but one way in which prices can be brought down to stay down, and in a way which will not kill the cow to get the milk—that is by a reduction in the cost of making and marketing.

In both these operations the buyer can play a vital part. The best equipped factory cannot operate economically without a sustained demand for its goods which will enable *mass production*, and it can not sell economically except through *mass marketing*.

IT IS to your interest to know that goods are *well sold*, as well as well made. You have to pay the cost of selling just as you have to pay for the cost of manufacturing. Think that over.

And the cost of selling is no small item. In some cases it costs more to sell goods than to make them. The seller who clings to antiquated, expensive methods of selling is no more entitled to your patronage than the one who runs an out-of-date factory, because *you have to pay* the additional costs in either case.

If the waste is to be squeezed out of selling, the buyer cannot escape a share of the responsibility in bringing it about.

THIS means recognizing in a substantial way the efforts of those sellers who have adopted modern, economical methods of selling, and one of these beyond any question is good advertising in good Business Papers. Advertising not only cuts the cost of selling, but it increases production volume and lowers manufacturing costs. It standardizes quality, and is a guarantee of good faith.

The sooner buyers begin to put this idea into practice in real earnest, the sooner will the benefits be manifest.

LIST *of* MEMBERS

Each has subscribed to and is maintaining the highest standards of practice in its editorial and advertising service.

Advertising and Selling
American Architect & Architectural Review
American Blacksmith, Auto & Tractor Shop
American Exporter
American Funeral Director
American Hatter
American Machinist
American Paint Journal
American Paint & Oil Dealer
American Printer
American School Board Journal
Architectural Record
Automobile Dealer and Repairer
Automobile Journal
Automotive Industries
Bakers Helper
Bakres Weekly
Boiler Maker (The)
Boot and Shoe Recorder
Brick and Clay Record
Buildings and Building Management
Building Supply News
Bulletin of Pharmacy
Canadian Grocer
Canadian Machinery & Manufacturing News
Canadian Railway & Marine World.
Candy and Ice Cream
Chemical and Metallurgical Engineering
Clothier and Furnisher
Coal Age
Coal Trade Journal
Concrete
COTTON
Daily Metal Trade
Distribution and Warehousing
Domestic Engineering
Dry Goods Economist
Drygoodsman
Dry Goods Reporter
Electric Railway Journal
Electrical Merchandising
Electrical Record
Electrical World
Embalmers' Monthly
Engineering and Contracting
Engineering and Mining Journal
Engineering News-Record
Factory
Farm Implement News
Farm Machinery—Farm Power
Fire and Water Engineering
Foundry (The)
Furniture Journal
Furniture Manufacturer and Artisan
Furniture Merchants' Trade Journal
Garment Weekly (The)
Gas Age-Record
Good Furniture Magazine
Grand Rapids Furniture Record

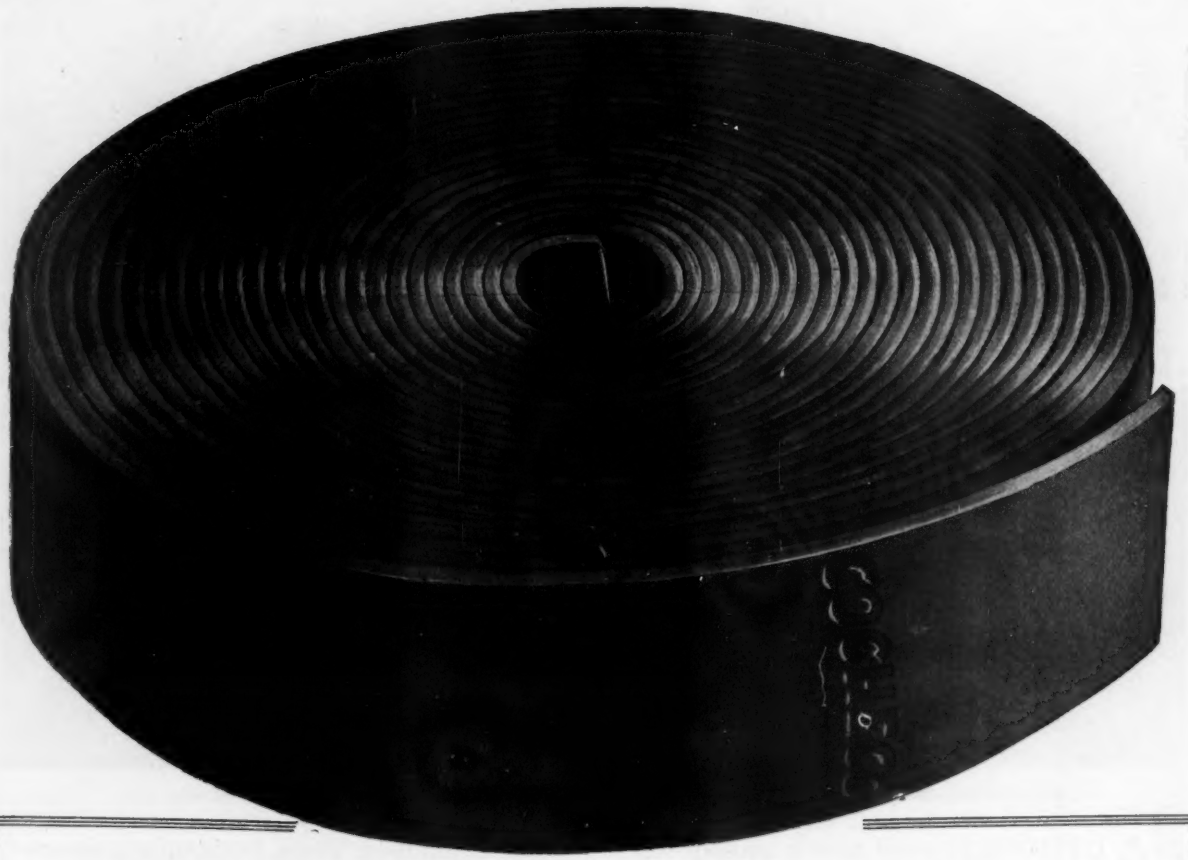
LIST *of* MEMBERS
(Continued)

Haberdasher (The)
Hardware Age
Hardware & Metal
Heating and Ventilating Magazine
Hide and Leather
Hospital Management
Hotel Monthly
Hotel Review
Illustrated Milliner
Implement and Tractor Age
Implement and Tractor Trade Journal
Industrial Arts Magazine
Inland Printer
Iron Age
Iron Trade Review
Lumber
Lumber Trade Journal
Lumber World Review
Manufacturers' Record
Manufacturing Jewelry
Marine Engineering & Shipping Age
Marine Review
Millinery Trade Review
Mill Supplies
Mining and Scientific Press
Modern Hospital (The)
Motor Age
Motorcycle and Bicycle Illustrated
Motor Truck
Motor World
National Builder
National Cleaner & Dyer
National Laundry Journal
National Petroleum News
Nautical Gazette
Northwest Commercial Bulletin
Northwestern Druggist
Oil News
Oil Trade Journal
Power
Power Boating
Power Farming Dealer
Power Plant Engineering
Price Current—Grain Reporter
Printer's Ink
Railway Age
Railway Electrical Engineer
Railway Maintenance Engineer
Railway Mechanical Engineer
Railway Signal Engineer
Retail Lumberman
Rock Products
Rubber Age
Sanitary & Heating Engineering
Shoe Findings
Shoe and Leather Reporter
Shoe Retailer
SOUTHERN ENGINEER
SOUTHERN HARDWARE & IMPLEMENT JOURNAL
Sporting Goods Dealer
Starchroom Laundry Journal
Tea and Coffee Trade Journal
Textile World
Welding Engineer
Wood-Worker (The)

THE ASSOCIATED BUSINESS PAPERS, Inc.

JESSE H. NEAL, Executive Secretary

HEADQUARTERS: 220 WEST 42nd STREET NEW YORK CITY



A Belt With "Twenty-nine Years' Service Without Repairs" to Its Credit

The general manager of a large textile mill in New Hampshire phoned us recently asking if we could repair a 36" double Cocheco Belt for them "overnight"—they wished to take advantage of the fact that the waterwheel on which it was running had broken down and would be replaced over the weekend.

In the course of the conversation he mentioned casually that both **wheel** and **belt** had been installed 29 **years ago** and had been in constant service (24 hours a day much of the time) ever since.

Our repair man found his job an easy one, a little cementing of the laps being all that was needed.

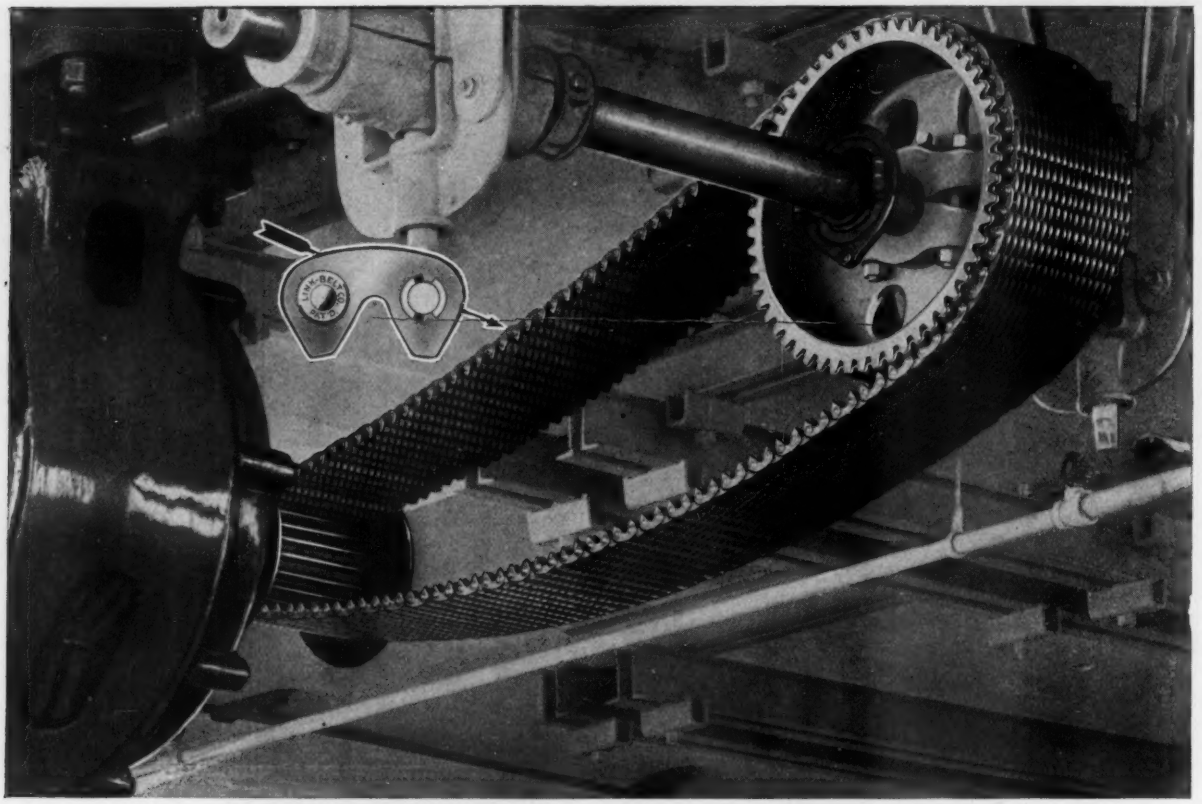
The wheel was worn out—but the Cocheco Belt was soon as good as ever, ready to drive the new wheel as long as it would go; a working example of the fact that **quality pays**.

COCHECO BELTING

I. B. WILLIAMS & SONS

Dover, New Hampshire

BOSTON, MASS., 157 Summer St.
NEW YORK, N. Y., 71-73 Murray St.
CHICAGO, ILL., 14-16 N. Franklin St.



Link-Belt Silent Chain Drive operating lineshaft—Flexible as a Belt—Positive as a Gear—More efficient than either.

ALTHOUGH great care is usually exercised in the purchase of machines, small consideration is generally given to the selection and design of the transmission.

In spite of the extremely high relative importance of the transmission and its great influence upon both cost of production and quality of product, it is often selected at random from one of the old forms of transmission, such as gears, belts and pulleys, etc., without consideration of the possibility of vastly superior results that could be obtained from the most suitable drive for the particular service.

Unfortunately, losses from such a source seldom show themselves directly to the management of a concern. Wherever conditions are such that the results produced by the transmission are recorded or noticed, Link-Belt Silent Chain will replace the older and more familiar drive in a large majority of cases.

If you desire to improve the character of work turned out by your machines or if you want to increase their output, give consideration to Link-Belt Silent Chain as the means of transmitting the power.

910

LINK-BELT COMPANY

PHILADELPHIA

New York	299 Broadway
Boston 9	49 Federal St.
Pittsburgh	1501 Park Bldg.
St. Louis	Central National Bank Bldg.
Buffalo	547 Ellicott Square
Wilkes-Barre	2nd National Bank Bldg.
Huntington, W. Va.	Robson-Prichard Bldg.

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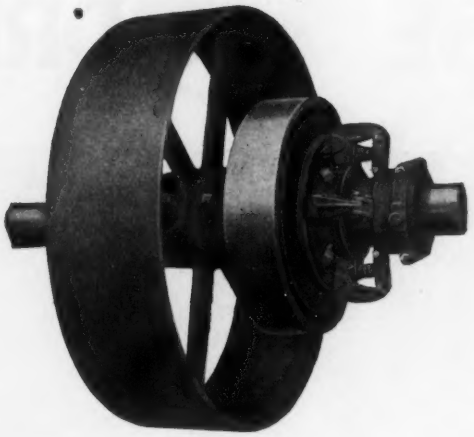

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Universal Giant Friction Clutches are made with standardized extended sleeves which permit the use of an ordinary pulley of any type.

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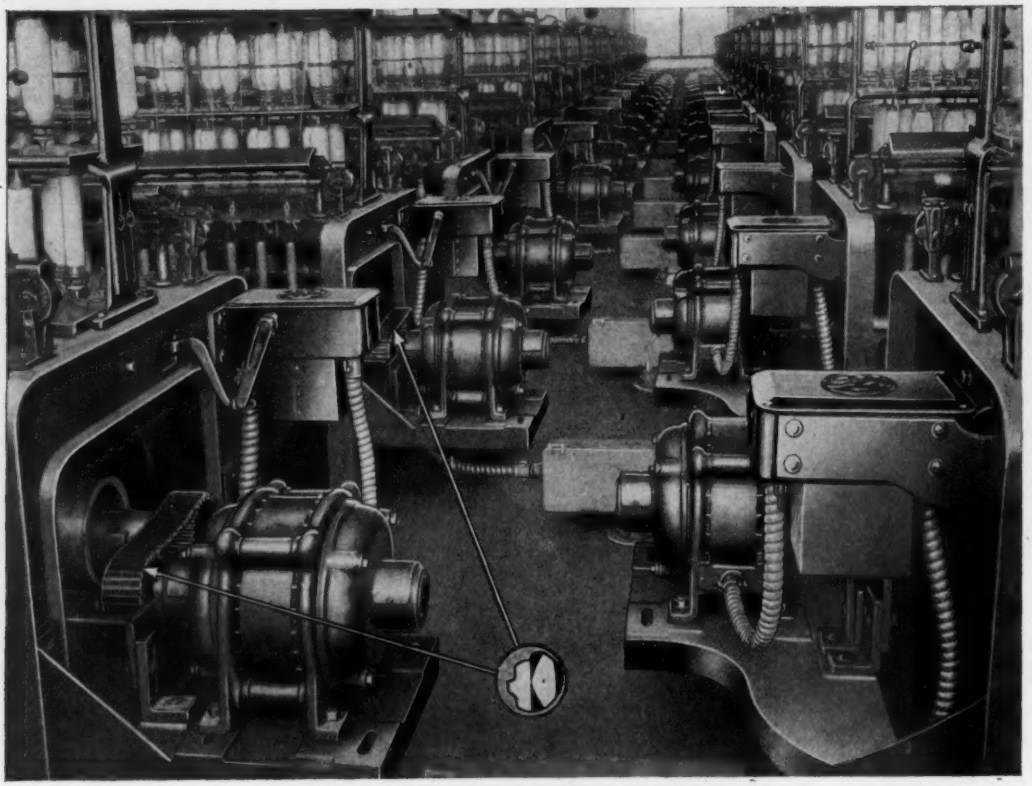

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Installation made in 1916

In equipping No. 5 mill in 1920 Morse Chains were specified.

the following are the results being obtained:

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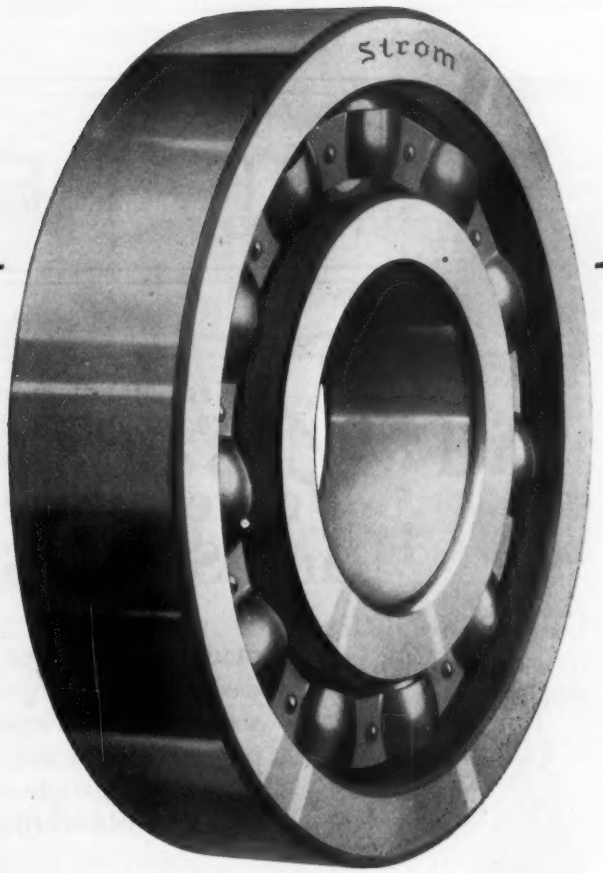
What are Your Card Settings When the Card Is Running?



It is probable that you cannot tell. No matter how careful you may be in gauging a setting the lost motion in the bearings will throw the adjustment off as soon as the card begins to run.

This is especially true of the lickerin. It cannot possibly run true if the bearings are worn. While the gauge may just slip in all the way along the drum, and the setting may appear perfect, yet if there is any slack in the bearings the setting is changed at the moment the belt is put on. And when the belt tightens under load when running, the change becomes much worse.

Inasmuch as bearings without play are essential to reliable settings there remains but one practicable recourse—the use of *ball bearings.*

Ball bearings will do more good on a lickerin than anywhere else on a card. The lickerin, being lighter than the cylinder or doffer, will move out of position easier with the belt pull. The lickerin, also, being run at higher speed than either of the others, requires more oiling; hence the surplus oil runs into the shroud and gets all over the plates and the cylinder clothing as well as that of the lickerin.

Ball bearings can be put on lickerins very economically. With them you can secure not only perfect and permanent settings, but also absolute freedom from oil trouble.

For further information on textile machinery, write to the Aldrich Machine Works, Greenwood, S. C.

U. S. Ball Bearing Mfg. Co.

(Conrad Patent Licensee)

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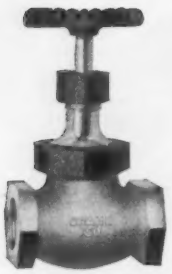

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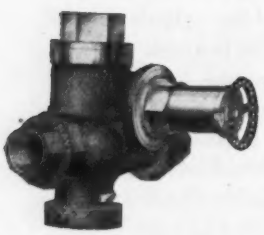

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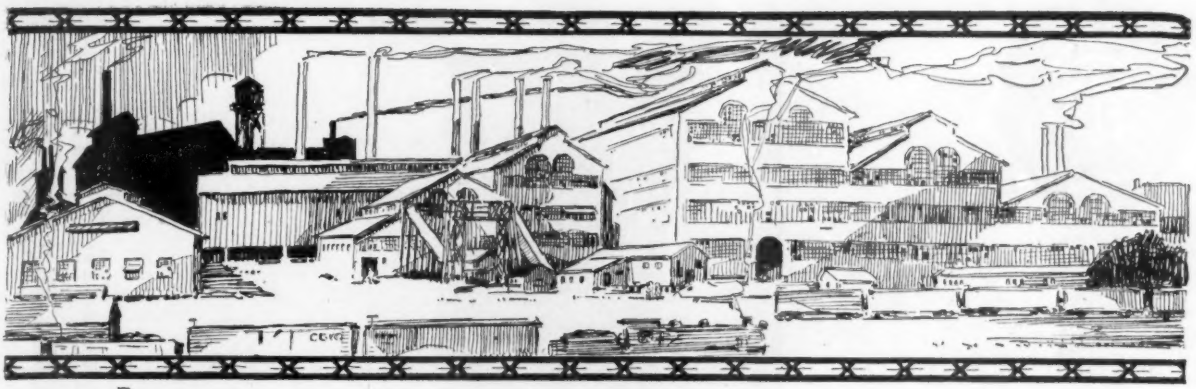

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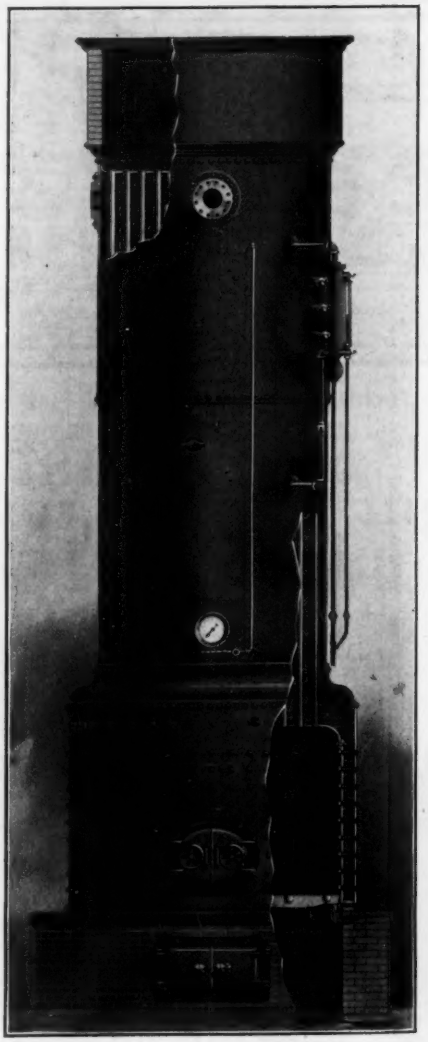

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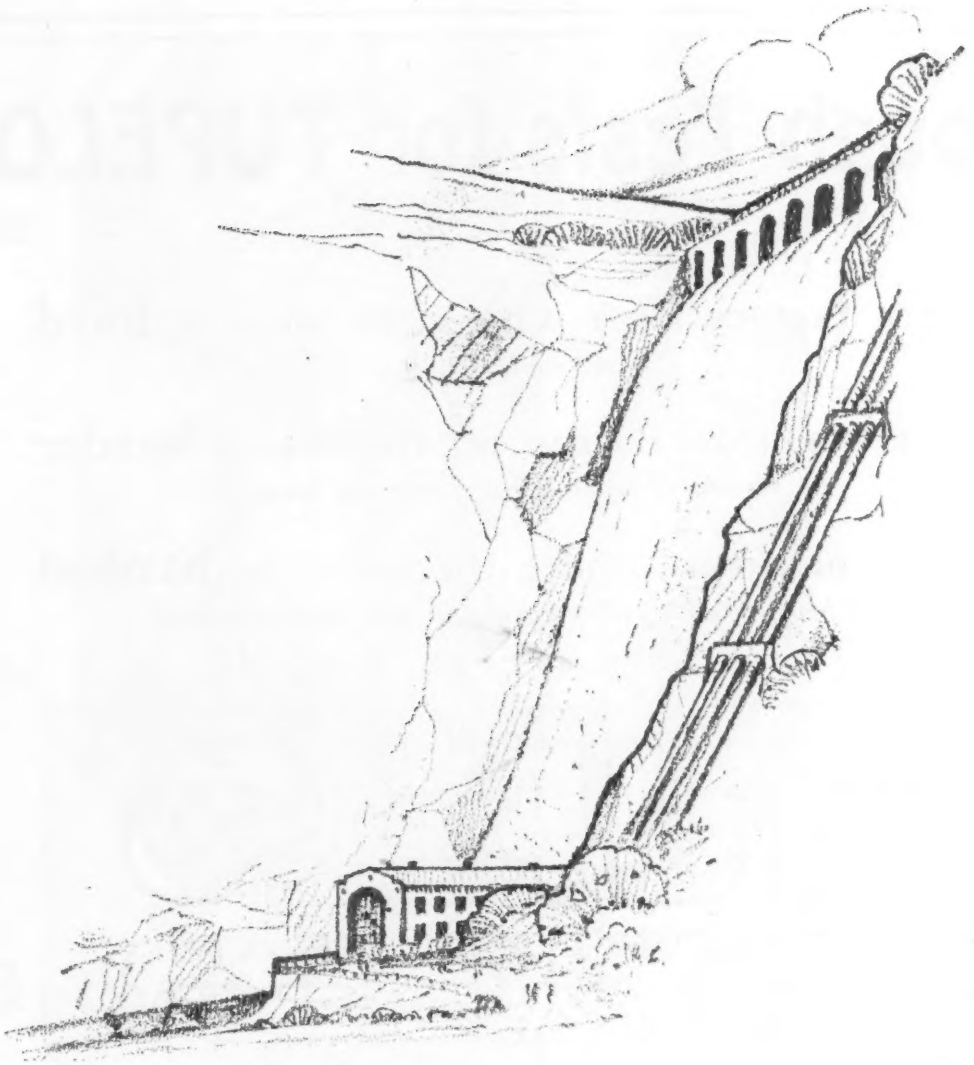

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For a **platform,** where the wear is **hardest**
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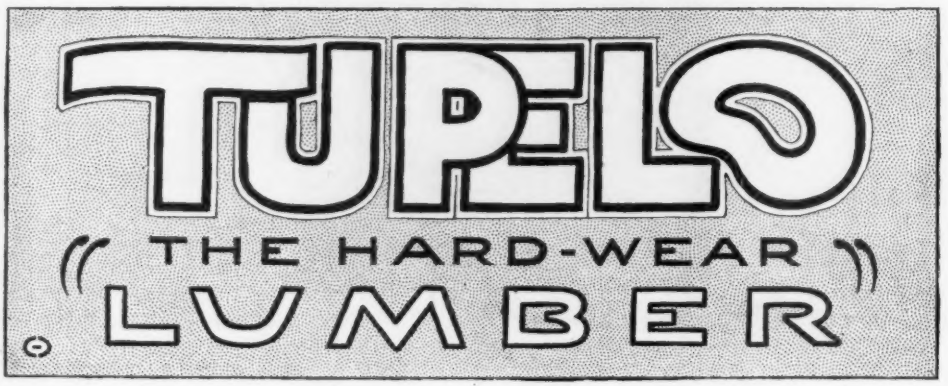

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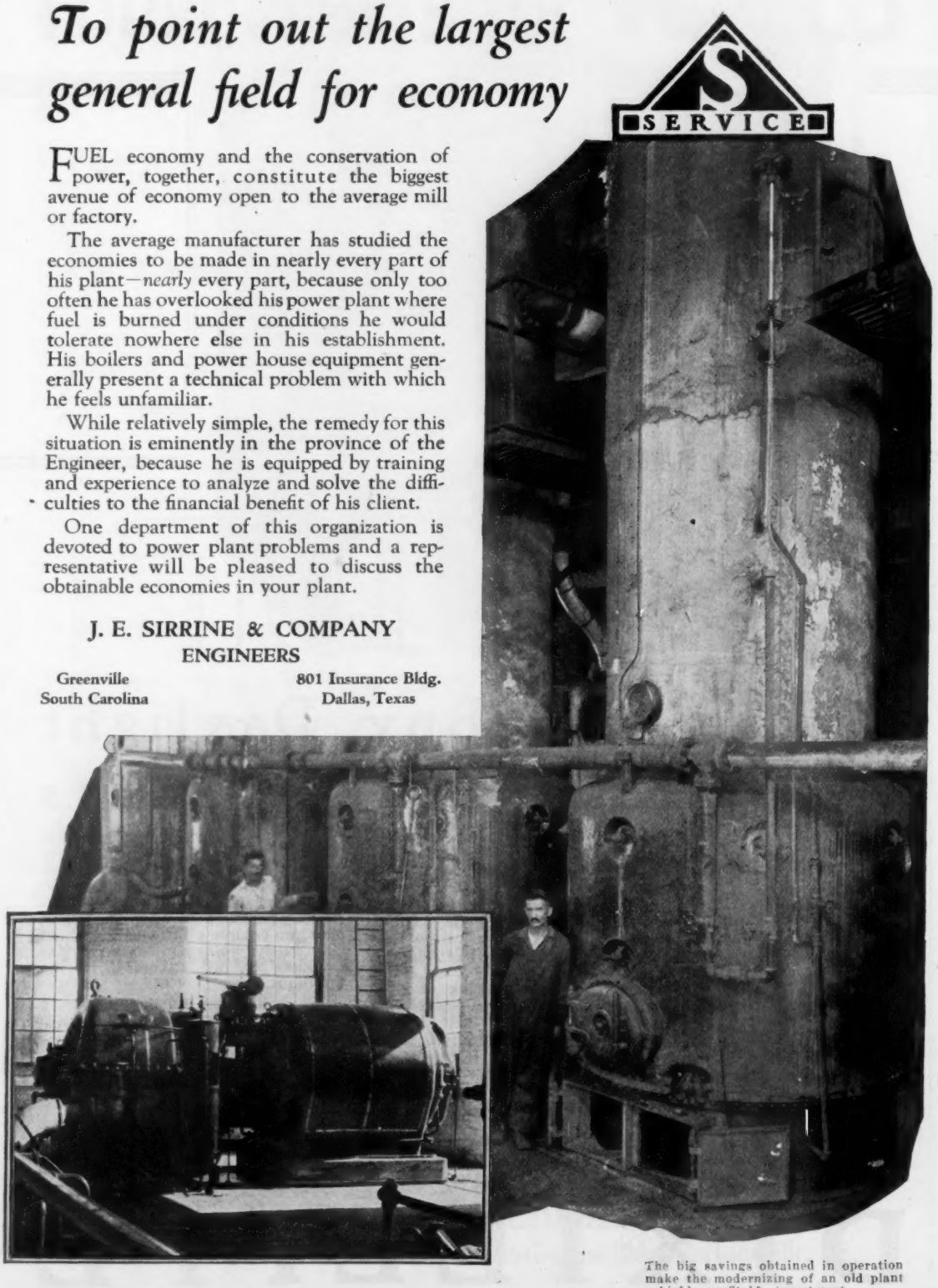

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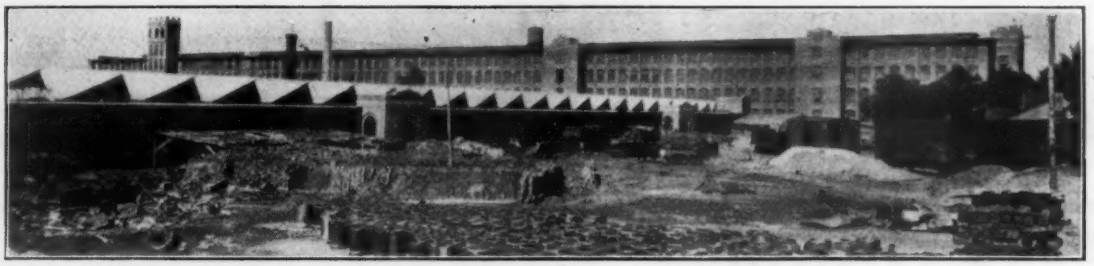

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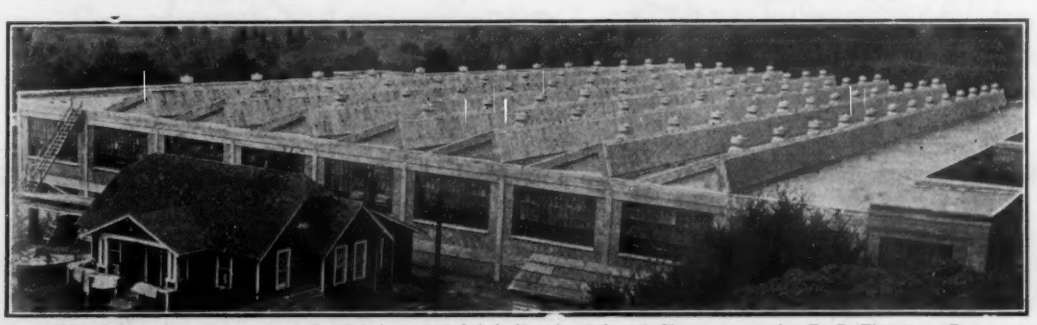

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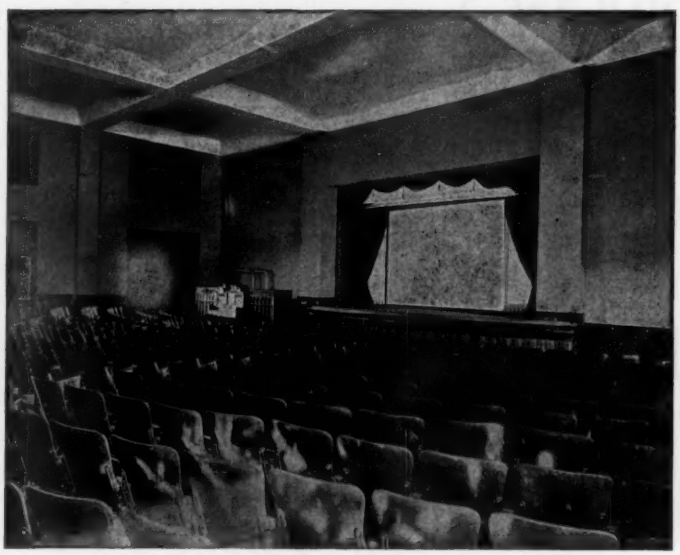

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Quoting A Practical Mill Executive

Mr. Frank Crummer, Purchasing Agent of the Aberfoyle Manufacturing Company, Chester, Pa., recently wrote us of the remarkable durability of Hyatt roller bearings in some of their machines, as follows:

"You may be interested to know of an installation of Hyatt roller bearings which shows their durability.

"In 1898 we installed 48 Hyatt roller bearings in a warp drying machine which operated continuously until dismantled in 1916.

"We found the bearings in first class condition (1916) and having need of some bearings for another job we reinstalled them on yarn reels in our Bleach House where they are giving entire satisfaction at the present time (1922)."

Just think of it—24 years service—18 years in one machine, then 6 years in another and still "giving entire satisfaction"!

This is typical of the durability of Hyatt roller bearings and indicates why they are an essential part of dependable, economical textile machinery.

Considering the many years of power and lubricant saving service without maintenance costs that these bearings will give you, can you longer afford to say anything to your machinery manufacturer except "Hyatt equipped"?

Hyatt Roller Bearing Co.
Industrial Bearings Division
New York, N. Y.

Motor Bearings Division, Detroit
Tractor Bearings Division, Chicago
Pacific Coast Division, San Francisco

USE HYATT BEARINGS ON YOUR LINE SHAFTS TOO

With the Publishers—

The Tomorrow of Trade Associations and Some Convention Dates.

Business looks upon associations as a luxury and supports them mainly when trade prospers. Associations have quite a different appraisal of themselves and are striving to prove that worth to business. The war crop of associations was the largest of record—amazingly large. The weeding out process has begun. The stalwart and necessary are sharing the uncertainty and the danger of the superfluous. The association's struggle to live matches the indifference of the business man to them when money is tight.

Meanwhile as industry becomes more complex and as competition flourishes, the business man feels a keen need to cuddle closer to his competitors for safety. The only vehicle for the necessary action appears to be the association, since more intimate forms of contact are taboo. This tendency of business to approach cooperation through the association arouses the government to discuss the trade association. The Department of Commerce, built to encourage business, wants to develop the best in the various associations. Mr. Hoover expressed it when he said that the more intense industrialization of the country resulted auto matically in specialization, and specialization leads to associations of specialists. The Department of Justice cannot frown upon this movement, but must keep a watchful eye lest these centralizing movements end in restraint in trade.

The business men, encouraged to cooperate but forbidden to combine, whirl around in a circle when asked to draw a line of association action which cooperates to the limit without combining. Because of this confusion, resulting from a disposition to lean toward associations, and from fear to take action through associations, the latter have entered a new era of uncertainty which threatens their existence. This raises the question as to what we are to do with these associations in the future.

The National Association of Manufacturers, itself an association, is interested in the question and will devote an entire session to it at its twenty-seventh annual convention in New York on May 8, 9 and 10. In preparation for this discussion, the manufacturers are preparing carefully two parts of the program. The first part will be the collection of detailed information describing the activities of the various national trade associations. The other part will be a list of speakers who will discuss every phase of the association question as it relates to business in the future.

The National Association of Cotton Manufacturers will hold its annual meeting at the Hotel Somerset, Boston, a little more than a week earlier than the preceding meeting, on Thursday and Friday, April 27 and 28. The Thursday morning program will begin with a discussion of the resources of New England, including power, transportation, manufacturing and community conditions. The Thursday afternoon general topic will be business conditions, including the tariff, taxation and foreign and domestic markets. Thursday night is "ladies' night" and will be devoted to social entertainment. On Friday morning there will be a number of group excursions to several of the well known manufacturing plants in and around Boston. The afternoon will be devoted to a program on research and production costs, and the meeting will close with the annual dinner of the Association on Friday night.

The Cotton Manufacturers' Association of North Carolina has chosen the same dates, April 27 and 28, to hold its convention at the Robert E. Lee Hotel, Winston-Salem, N. C.

The Georgia Manufacturers' Association is preparing to hold its annual meeting in Atlanta on May 17 and 18. It is reported that a most interesting program is being prepared.

The National Association of Hosiery and Underwear Manufacturers will hold its annual convention at Philadelphia on May 23, 24 and 25, while its annual exhibition will be held at the Philadelphia Commercial Museum the same week from May 22 to 26 inclusive.

The American Cotton Manufacturers' Association will hold its 26th annual meeting on the last two days of the same week, May 26 and 27, at Washington, D. C., the New Willard Hotel being official headquarters. The sessions will be held in the large convention hall on the 10th floor of this hotel. An excellent program is being arranged. The annual dinner will be held on Friday evening in the banquet hall at the Willard. Secretary Adams has arranged for rooms at The Willard, The Washington and the Raleigh, and reservations should be promptly made. It is reported that among the speakers who will appear before the delegates of the American Association during the sessions of the convention will be a number of highly prominent men in Washington executive departments.

The semi-annual meeting of the Southern Textile Association will be held this year at the Oceanic Hotel, Wrightsville Beach, Wilmington, N. C., on June 2 and 3. This resort has been the scene of former conventions of this Association, and surf bathing will be among the chief amusement features of the gathering. During the sessions of the meeting, the reports from the chairmen of the sectional committees will be made, and it is expected that the feature of practical discussion to follow the presentation of each report, which was successfully promulgated at the Atlanta meeting, will be repeated at this convention. Also, this being the fourteenth annual convention, the election of officers for the Association during the coming year will be held.

The Middle States Textile Manufacturers' Association will hold its annual meeting at Louisville, Kentucky, on July 19th.

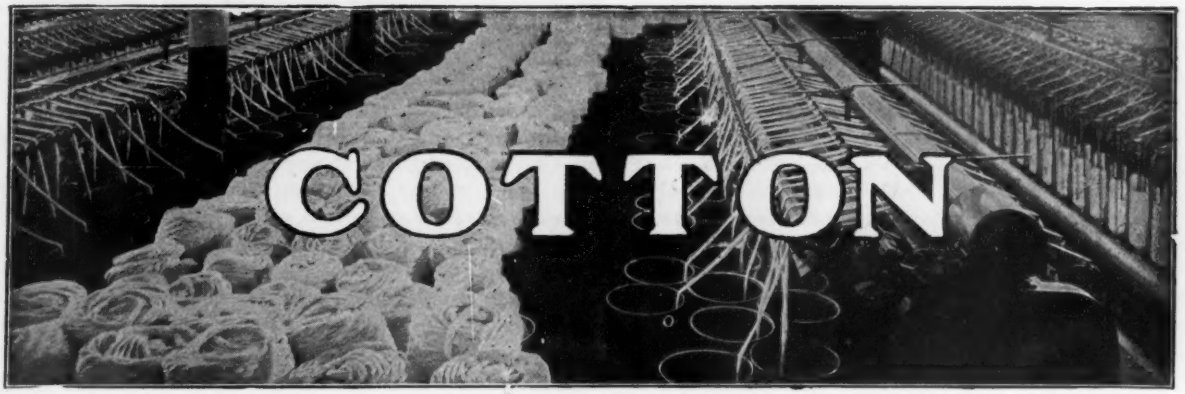
The Fifth Southern Textile Exposition will be held at Textile Hall, Greenville, S. C., on October 19 to 25 inclusive, and the space in the main hall is already sold. Balcony space is going rapidly and efforts are being made to secure additional space in an outside building close by the main hall.

AMONG COTTON'S READERS

Joe M. Gamewell,
General Manager, Erlanger Cotton Mills Co.
Treasurer, North Carolina Finishing Co.
Lexington, North Carolina.

"COTTON is considered by us distinctive in leadership—wide awake—especially on pertinent issues of the day pertaining to the art of textile manufacture from raw material through to the finished fabric."

Jos M Gamewell



April, Nineteen-Twenty-Two

Why Not Develop Latin America?

Every little while some economist feels called upon to sound the alarm because the United States has accumulated the biggest gold reserve in the world. Experts place the figure at about $3,500,000,000. It is a sizeable total even in these days when we are accustomed to talk loosely about billions and when a mere trifle like a million dollars is looked upon more as a necessity than a luxury.

The piling up of the world's gold in the coffers of the United States is used as the excuse for all sorts of suggestions, from the cancellation of our foreign war loans down to wild-cat proposals of unlimited issues of fiat money, guaranteed to make everybody rich and everybody happy.

There is something strange in the persistence of the efforts to turn this tide of gold back to Europe. Not a day passes but what some international philanthropist proposes that it be used to reinforce the tottering financial and economic structure of Europe. It requires no prophet to forecast chaos on the basis of the relentless downward tendency on the other side of the Atlantic. Every day come new stories of larger governmental expenditures and smaller governmental incomes, of new programs to stave off the inevitable day of reckoning, of new billions of marks and crowns and rubles, not to say francs and lires, issued by governmental printing presses as a fictitious substitute for coin.

It is into this morass that these kind economists would sink the gold of the United States, in a hope that somewhere it might strike bottom and give the world something to stand on.

Here and there Uncle Sam's billions might effect temporary relief. But this relief would quickly be counteracted by the new extravagances it would encourage and the gold would be sucked up as quickly as the Atlantic swallowed the Titanic—nor leave a trace behind.

It is strange in all of this economic theorizing that so little is said about the possibility of putting some of these millions to work—for the United States—in the rich countries to the south of us. They have just as great a wealth in natural resources as have the trackless steppes and forests of Russia; they have industrial opportunities that, in their way and in their size, compare favorably with those of Europe. Some of these countries, it is true, have currency systems that contain a considerable dilution of paper money but none of them has sunk to the level of five-sixths of the European nations whom we are continually asked to help with our gold.

In Latin America, from the Rio Grande to Tierra del Fuego, it is not a suggestion of philanthropy nor even of humanity, but of cold business. In these days of dollar marks, trade follows investments far more speedily than it ever followed the flag. The investment of American money in Mexico, in Central and South America, is the surest foundation for the extension of American trade. This does not mean that money is to go into blue-sky enterprises, into wild-cat oil fields, into submarine orange groves, or fictitious rubber plantations. It means that the money must be carefully invested by bankers and experts who know the nations with which they deal as well as the good faith and the industrial prospects of the people to whom these millions are to be lent.

All through these countries rich enterprises are calling for funds to make possible the exploitation of their resources and to give modern industrial employment to their populations. There was a time when these countries turned first to Europe. The United States was not then a creditor nation. It had little surplus to invest outside its borders; its own railroads, its mines, its industries called continually upon Europe for capital. Besides this, the United States had failed, in a hundred ways, to establish friendly relations with the proud Latin populations and the Spanish-American war played no small part in handicapping American trade.

All that is past now. Equally as important as the increased friendliness of our relations is the fact that Europe no longer has the great surplus millions of pre-war days available for foreign investment. The United States has jumped, in one great leap, from a debtor to a creditor nation. The United States may well learn a lesson from its European rivals in the treatment of these Latin-American opportunities. Before the war, Great Britain and Germany almost elbowed us out of the markets, not merely by selling cheaper wares on longer credits, but by the lavishness of their European investments and their control of ocean transportation. Despite the handicap of her position, Germany has regained a considerable percentage of the trade which vanished in the war. Great Britain has taken advantage of every opportunity and has sought to strength-

en herself throughout this vast empire. She has the ships —so have we. But Great Britain keeps hers running, even at a loss; ours lie rusting at the docks.

In the field of South American investments, Germany has nothing to offer. If one were to judge by the fact that Great Britain has not paid the interest on her debt to the United States, one would conclude that England had no surplus to compete with us in South American investments. This is not true. England is loaning money with a lavish hand to all of these countries, and she is doing it with the one great purpose of annexing their markets. The English know the secrets of world trade. They need no demonstration that trade follows investments. They are lending their money not only in South America but in Asia Minor and, for that matter, in every other country, where the trade prospects promise dividends in addition to interest.

It is an example worth our while to study and to follow. Having followed it, it will be up to our manufacturers to follow the investments. The rich markets of South America will not be ours merely because of these investments, no matter how liberal they may be. They will be only the introduction to the consuming power of new and busy millions.

To the cotton industry, this should mean much. Latin America can feed herself, but like all the rest of the world her millions look to the cotton of the United States for clothes.

What Shall the Harvest Be?

The raw cotton situation is of paramount interest to the entire cotton trade. It is doubtful if the carry-over to the next crop will reach four million bales. Also it should be remembered that at least a part of this amount will be low grade.

It is, of course, too early to even estimate the acreage for 1922, but efforts are being made in some quarters to compel a reduction in cotton and an increase in the planting of foodstuffs. Fertilizer sales from August 1 to February 28 showed a decrease of 16 per cent, compared with last year, according to Secretary Hester of the New Orleans Cotton Exchange. This means a decrease of 70 per cent as compared with the same period two years ago. This decrease may be offset somewhat by substitutes, but that is another guess.

Furthermore, a heavy infestation of boll weevils this season is indicated by observations made at the Delta Laboratory, Tallulah, La., where for a number of years the Bureau of Entomology, United States Department of Agriculture, has been making a series of studies each season to serve as a basis for predictions regarding the expected severity of Spring infestations of the pest. The records for 1922, which were recently completed and compared with similar records for the last eight years, points to a heavier emergence of the pest from winter quarters than in any previous season during that period. In fact the records for this year show more than five times as many live weevils in hibernation than was the case last year. Whether the Bureau's investigations may be taken as a guide for the conditions over the entire belt is still another guess. However, it is the only authentic information available on the subject, and the Government recommends that the 1922 acreage be reduced to the absolute minimum in order that the farmer may properly work his cotton and keep the weevils well in hand. Whether or not this will be done remains to be seen.

In any case, a study of the foregoing conditions would seem to indicate a short crop.

On the other hand, state cooperative marketing associations are being formed with a considerable degree of apparent success, and as the efforts of these marketing associations are intended to stabilize the offerings of cotton for sale, the tendency will be toward a better price for the cotton. The psychological effect of this on the individual planter will be to strive for a slight personal advantage by putting an excess acreage in the staple on the possible chance that the weather conditions during the coming Summer may be unfavorable to weevils and thus offset the heavy early infestation indicated. No man may be justified in gambling on the chance of securing the abnormal weather necessary to overcome the handicap of the probable abnormal weevil infestation already forecasted, but, as is well known, all Americans like to take a chance. What they will hope to do and what they will succeed in actually accomplishing are other unknown quantities that may be added to the annual guessing contest of the already burdened cotton manufacturer.

"Watch Washington."

In December, 1920, COTTON editorially advised its readers to "Watch Washington." That the admonition is still timely is evident from an editorial in *The World's Work* for March urging the same action.

Sixteen months ago we indicated the danger of Congressional tendencies toward extravagance and their reaction in inflated taxation, at the same time warning all taxpayers that their watchword should be "Watch Washington." That the condition is not materially changed today may be readily understood from *The World's Work* editorial referred to, for in it they point out that—

> "Desperate men, selfish men, greedy men, lazy men, dreamers, theorists, and fanatics are assailing Congress with a ferocity little short of savage. They all want money—your money. Raids on the Treasury are nothing new, but never before have so many, of such extent, been attempted all at one time. The bonus, the crop purchase, the ship subsidy, the tariff —every one of them running into the hundreds of millions, and two of them into the billions—and all to come out of increases in your taxes.
>
> "Every one of these measures proposes a gift of money—not the loan of it. They propose to take money out of your pocket and to put it in somebody else's pocket, and leave it there. Never mind how hard you worked for it; never mind how fully you earned it; never mind how much you need it—the other fellow wants it, and he is organized to force Congress to get it. If you don't organize to force Congress to stop him, he's going to get it."

We have done our part. Have you expressed your desires to your representative and senator? Are you watching Washington?

American Society of Mechanical Engineers to Meet in Atlanta in May.

The spring meeting of the American Society of Mechanical Engineers will be held in Atlanta, Ga., beginning on May 8 and continuing through May 11. An extensive and highly interesting program is being arranged, and the meeting is expected to draw a large representation of the society's membership of 16,000 from all parts of the country. The industrial growth of the South, its amazing progress during the last decade, and its enormous potentialities in the future, will thus be brought to national attention. This meeting in Atlanta is the first to be held by the society in the South since the New Orleans meeting in 1916.

The development of engineering interest in industrial problems will be considered by leading men of the country in the sessions of the Atlanta meeting. These sessions will embrace the textile, steel and power industries as well as southern management problems, a field in which the engineer is an increasingly important factor.

On Tuesday morning, May 9, the second day of the meeting, a textile session, one of the most important of the meeting, will be held. Textile problems, involving comparison of the white labor of the South with the foreign labor of the North, will be taken up. S. E. Gillespie, of Dallas, Texas, will discuss "Cotton Ginning Machinery." H. E. Lindley, of Atlanta, will discuss "Increased Textile Production" and E. H. Marble, of Worcester, Mass., will deliver an address on "The Maintenance of Textile Machinery." Charles T. Plunkett, of Adams, Mass., is chairman of the Textile Division of the Society which are handling the arrangements for the textile session.

Another session that will be of interest especially to textile manufacturers is the meeting of the Management Division which will convene on Thursday morning, May 11. At this session, F. H. Neely, works manager of the Fulton Bag & Cotton Mills, Atlanta, will discuss the "Comparison of Southern White Labor with Foreign Labor of the North." George S. Harris, president of the Exposition Cotton Mills, Atlanta, will take up the general subject of "Management in Textile Plants," and E. A. Lucey, of New York, will speak on "Reducing Costs in Textile Mills by Increasing Production."

Two other papers of direct interest to cotton mill men will be delivered at the Machine Shop Division on Wednesday, May 10, one by L. B. Jenks, Crompton & Knowles Loom Works, Worcester, Mass., on "Weaving Machinery"; and the other by F. E. Banfield, Jr., of Newton Upper Falls, Mass., dealing with "Modern Shop Methods Pertaining to the Manufacture of Revolving Flat Cards."

Other sessions of the convention which will be of importance will be the public hearing of the Power Test Codes Committee, to be presided over by Fred R. Low, of New York; and a meeting of the Materials Handling Division, of which the principal speaker will be F. L. Leach, of New York. These two meetings will be held on Tuesday, May 9. The Fuels Division will meet on Wednesday morning, and the Power Division will hold a session on Thursday morning, at which the power development in the southeast, new developments on hydro-electric design and the economies of water power development will be discussed. A symposium on welding is scheduled for Thursday.

On Tuesday afternoon an extensive social program will get under way. A barbecue, a golf exhibition match at the East Lake Country Club are among the afternoon attractions and in the evening at the East Lake Country Club there will be a dinner dance. Wednesday afternoon there will be excursions to points of local interest and in the evening another dinner dance at the Ansley Hotel Roof Garden. On Thursday afternoon there will be a theatre party at the Howard Theatre.

The growth of engineering effort in the South has vastly increased since the 1916 meeting at New Orleans, and the American Society of Mechanical Engineers is being brought into more intimate contact with engineering thought and achievement in this section. A number of men connected with the southern textile industry are interested in this organization, and it is expected a number of these will attend the sessions of the Atlanta meeting.

Congress Should Act.

The news reports from the New England strike district recently contained a little item that is of personal interest to every manufacturer. It was merely the announcement of the arrival of an Italian vice-consul and a Portuguese vice-consul to investigate the condition and treatment of groups of their countrymen employed in the mills of that section prior to the strike, and now demonstrating their dissatisfaction with their American employers.

In other words, despite the prolificness of our congressmen in enacting laws during the last hundred years or more, we are still without a suitable Naturalization Act that will prevent the segregation of groups of unnaturalized aliens. This leaves the way open to international complications every time these aliens decide to start a "rough house" or a riot instead of continuing peacefully at work. If Albert Johnson, chairman of the House Committee on Immigration and Naturalization, would amend the Committee Bill on naturalization so that the annual registration fee for unnaturalized aliens 21 years of age and over was set at not less than $25, and for aliens under the age of 21 at not less than $10, and then get this bill enacted into law, there would be an immediate and definite move on the part of such unnaturalized aliens to change their status and avoid paying the annual registration fee.

Those aliens who do not desire to become citizens and who only wish to remain here long enough to accumulate money to place themselves in better circumstances back home, would thus pay for this privilege—if they consider it as such.

Most important of all, the money thus obtained would pay the legitimate expenses of proper registration and allow the authorities to keep in touch with all aliens, their movements and their actions.

It now seems as if politics would also interfere with the passage of a permanent immigration law at this session. Senator Harris, of Georgia, wishes to exclude all immigration for a period of five years, but it is doubtful if this suggestion gets very far. Another temporary move is to continue the present three per cent restriction bill for another year and this will probably be done. But it's simply a case of expediency. It's setting aside a matter important to the welfare of the nation merely because of the possible effect next November.

On these two questions we have heard much talk, but now Congress should act.

Personnel Enthusiasm and Production

BY RICHARD NEWBECKER.

Our dictionary defines the word "enthusiasm" as representing the state of one who gives his whole heart to a pursuit or idea of the work in which he is engaged. But how many of our mills are there in which the potent force of this one word is given sufficient consideration, and where its beneficial influence is allowed to permeate the entire crew?

With the trials that have beset industry during the last year or two still fresh in our minds, and in the full realization that in the future a high standard of efficiency and production will be absolutely essential for the profitable operation of our mills, it may be well to dwell a little longer on the full meaning of this word enthusiasm, as it effects the ordinary industrial plant.

While it may seem strange to say, it nevertheless is true that many of our present-day plant managers, instead of cultivating enthusiasm, are unintentionally failing to avail themselves of the benefits that can be obtained through its proper use and application in the mill.

In order to secure the greatest benefit from an enthusiastic factory personnel, to spread the gospel of enthusiasm and to keep it alive and in full force, the factory manager should remember that his factory crew is made up of men and women who are human beings, finely woven together, with a set of high tension nerves adjusted by the hand of the Creator, and he should not fail to remember that enthusiasm is the life current which supplies the pulling power of this human mechanism. It can be appropriately compared to the electric battery in your automobile, Mr. Mill Manager, you must be continually recharging the battery if you expect the engine to start when you press the button.

If you are continually drawing off the current and fail to recharge the battery, sooner or later you will find you have a weak battery which will not respond when you press the button. A factory run without a spirit of enthusiasm permeating the foremen, department heads and employees, is much like the battery that is used continuously without being recharged, and some day the manager awakens to the fact that his factory battery, called enthusiasm, is weak, or entirely run down. And that the factory forces will not respond to his touch of the button.

When the factory manager comes to the plant in the morning with a well-developed grouch and fails to greet the foreman or department heads with a pleasant "Good morning," he draws off a little of the current of enthusiasm. Next he may walk down the line and reprimand the department head or foreman before the entire force of workers in a certain department for some mistake or failure, and again he draws off more current from the battery of enthusiasm. Again, he may fail to give praise where praise is due, and this time he is failing to recharge the battery.

The very best recharging machine on earth for the human battery of the factory force is a firm, but cheerful, kind, good-natured factory head, one who doesn't act the part of emperor over his employees, but who believes in, and practices, the brotherhood of man.

After inventory is taken and the balance sheet is out and a favorable showing has been made, the right kind of a mill head will tell his superintendent and department heads about it, he will let them know and feel that they have helped to make it so, and that he has every reason to expect and to know that they will bend every effort to make the following year a still better one. Pin your flowers on them on this side of the grave, Mr. Manager, and make each feel that he or she is a part—an important part—of the factory, that you are depending on them to do their bit when the wheel comes around to their respective cogs, and they are certain to respond well.

If new equipment is to be added, by all means the foreman of the department to which this is to be added should be consulted. In this way, he will get a "charge" of that quality of enthusiasm so very necessary in the production end.

Should a department head or other head make a blunder, and they most surely will, don't show your authority before the entire working force. To do so injures the employees confidence in the foreman, as well as the entire factory system. It injures your own influence with the party in error, and will only create more trouble all along the line, which sooner or later must be eliminated, or the confidence of the employees in the foreman will be ruined and the usefulness of both the foreman and the employees thus reduced to the minimum.

If attention to some mistake or error must be called, let this occur in the office, and then make it appear that you are glad to call the party's attention to the matter, and intimate that you no doubt will never find conditions in the same way again. But by all means cutting remarks should be avoided, as this will kill enthusiasm in a department quicker than anything else.

In conclusion, I would sum up the entire matter of increasing the efficiency of the working force, and of keeping the battery of enthusiasm charged to full load with energy in these few words: Give your factory force exactly the same treatment you would like to have from the owners of the plant under the same conditions, and you cannot fail to strengthen the life current of enthusiasm and increase the production of the plant.

In handling material in process in the mill, it is essential that it be kept protected against damage and soil while in transit, in order to assure the final delivery being in good condition. The box trucks, transfer trucks and baskets manufactured by the G. B. Lewis Company, Watertown, Wisconsin, are very light in weight, yet durable, state the manufacturers, and are fitted with "thread guard" casters to avoid time loss. A valuable feature of these trucks and baskets is that they are supplied with detachable canvas liners which are washable, thus preventing damage to goods through a dirty lining in the receptacle. The Lewis line also includes pilfer-proof transfer trucks with lock covers, and tapered hand baskets, which are declared to be particularly adaptable for handling lighter colored goods that must be kept clean in process. The strong gumwood and wire construction, it is stated, give these articles a long life, and as they are shipped in a knocked down form, a much lower freight rate is obtainable than would be the case with assembled materials.

The Salesman to Latin America

BY A. L. WHITE.

"In time of peace, prepare for war" might well be changed now to "In time of business depression, prepare for future activity.' In no line is this truer than in foreign salesmanship. It is becoming more and more evident that if the United States is to hold its own against the competition of other nations, the manufacturers and exporters must take foreign trade a little less as a gift of the gods and a little more as something to be striven for and to which the most scientific methods of salesmanship must be applied.

Particularly is this the case in South America where the competition with European firms will always be keen. South America has before it a vast development and a constantly increasing purchasing power as its resources are opened up and its population increases through immigration. It is so promising a field that all the manufacturing nations strive to get a good business there, and as, generally speaking, it is a producer of raw materials only, it is dependent upon other continents for its manufacrured wares. Whether a large part of this demand for manufactured goods is to be directed toward the United States or will revert to the European countries, as before the war, depends upon the energy, business wisdom, and selling ability of firms in the United States.

Certainly, if there is to be a continuance of that interchange of commodities between North and South America which will prove profitable to both continents, a better knowledge of South America on the part of the people of the United States is imperative. Particularly should the manufacturers of the United States have available well trained salesmen to go into the South American field. Realizing this, many of the big firms train men exclusively for Latin American business. The wise exporting firm will not entrust its foreign business to any man who has not very high qualifications. For this reason, the salesman with vision and ambition should take advantage of this time of business inactivity to prepare himself for this new field for the exertion of his energies.

That nothing can really take the place of a good salesman or representative in South American trade has frequently been called to the attention of the North American manufacturer. In Paraguay, for instance, a country which is somewhat off the beaten path of the ordinary salesman to South America, the importers state that they always have more satisfactory relations with firms whose representatives have visited that market, because the representatives have studied out the particular demands of the trade and understand the conditions under which the importers do business.

This understanding of business conditions in the particular locality in which the salesman is to operate is one of the requisites for his success. Of course, this knowledge is best gained by actual study on the ground, but a salesman can prepare himself for South American business by making a preliminary study of climatic conditions, geographical position, trade routes, and transportation facilities. It may sound absurd to suggest that a salesman should study the geography of South America, but many mistakes have been made by North American firms because of a lack of knowledge of the geographical position of certain countries, and two places that look in close proximity on the map may be, in reality, inaccessible to one another on account of lack of transportation facilities. Many parts of South America can only be reached by slow river transportation or by means of burros or llamas. Climate and industrial conditions, also, influence the demands of the people, and transportation facilities affect the quantities purchased and the mode of packing.

The salesman must also have some knowledge of the tariffs and duties of each country, what each country produces, and the requirements arising from such restrictions and production. While South American countries have the one fact in common that they all are producers of raw materials, the type of products varies widely, and each republic has its own political and economic problems, which the salesman must understand in order that his efforts may be truly effective. On account of the varying rules in regard to duties and tariffs, one of the greatest annoyances the salesman to South American countries encounters is in the matter of getting his samples through. In most of the South American countries, samples may be sent through in bond, but in some, bond is not accepted and the duty has to be paid. Many technical details arise in clearing samples, and numerous documents are required. Information in regard to the clearance of samples into the various countries may be obtained from any branch of the United States Bureau of Foreign and Domestic Commerce, or from the consul generals of the South American countries. Some of the republics, also, impose a travelers' tax, which is another matter for the salesman to consider in connection with transportation.

Of course, the fundamental necessity for any successful salesman, in any field, is an understanding of people. A mistake that is possibly most often made is that of thinking that foreign buyers should receive entirely different treatment from customers in the United States. The salesman who has tactfully handled customers in the United States should be equally successful in South America if he uses the same degree of common sense and tact in his dealings.

Anything which finds a ready market in the United States can also be sold in South America, with due allowance made for difference in climate and industrial conditions. The story is told by one who has traveled extensively in Latin America of a tribe of Indians down on the coast of Central America which has clung to its tribal identity against the inroads of other races. But in spite of their exclusiveness, one custom taken from other peoples has become almost a mark of the tribe: all the men wear derby hats. Sometimes the hat does not fit and is worn jauntily perched upon a head several sizes larger than the hat; sometimes the rest of the clothing does not exactly match the hat; nevertheless the derby hat seems to be the badge of manhood's estate in that tribe. These hats were introduced into the tribe many years ago by an enterprising salesman from the United States who on one of his southern trips visited this tribe of Indians and found the men wearing for headgear small caps, a custom which

they had probably picked up from sailors. He conceived the idea of selling them derby hats instead of the caps, and the Indians succumbed so readily to this persuasive salesmanship that he succeeded in working off a whole consignment of these hats to them, thus starting the tribal style in headgear.

This illustrates what a really live salesman can do by studying his ground and understanding the line of approach to his customer. Good salesmanship, however, comprises more than making one freak sale, good-sized though it may be. It consists in laying the foundations for a good future business by studying out and meeting the natural requirements of the market.

The story is not intended to convey the impression that most of the people of the Latin American countries are primitive in their buying instincts, for this is not the case. The idea that the South Americans are not good judges of materials and are buyers of cheap goods is fairly prevalent in this country and entirely fallacious. The higher class of Latin Americans are quite as cultured as most North Americans and more widely traveled. They have a keen appreciation of the finer things of life and demand the best. Moreover, South American tastes in manufactured goods are acquired from Europe and the United States inasmuch as South America, itself, is not a producer of these goods. On account of this foreign impress upon South American business and tastes, a similarity of buying exists throughout the continent. The buyers are largely the same in all parts—a small, wealthy, cultured class, with high individual purchasing power, the mass of the natives of each republic, whose buying power is not very high and varies according to the development of the different republics, Europeans, some Americans and some Orientals.

The merchants, generally speaking, are considered fairly reliable. Since they have done business with exporters from all parts of the world, they are rather cosmopolitan and adaptable, and, on account of lack of capital and the handicap of transportation difficulties, they are keen traders. They like to see the exact goods they contemplate buying. This is reasonable, considering their distance from the source of supplies and the waste of time should the product not prove satisfactory upon delivery. For this reason, the salesman should carry a broader line of samples for South American business than in the domestic trade.

In trying to do business with the South Americans, nothing, of course, quite takes the place of ability to speak their language. In most of the South American countries, the language is Spanish, except in Brazil, where Portuguese is used.

Conformity to the Latin American method of doing business often proves tedious for the energetic American salesman, accustomed as he is to the rapid transactions consummated in the United States. The Latin Americans are leisurely in their transactions. Even after considerable time and energy has been expended in establishing friendly relations, it is impossible to come straight to the point, and sometimes an hour or more has to be devoted to making flowery speeches and to exchanging polite inquiries. However, this is not wasted time, for the Latin Americans are very responsive to courtesy and observant of the little niceties. Social amenities and business are closely interwoven, and usually the first call should be merely for the purpose of getting acquainted. If possible, a salesman should carry with him good letters of introduction, for if well introduced he will find the Latin Americans very cordial. An American who has been a resident of Buenos Aires for many years says that no one can like a South American very long without receiving a warm reciprocation of feeling.

In Buenos Aires, or, in fact, in any of the other South American cities, the salesman must expect to have to spend considerable money on social matters. He is a representative of his firm and attention to social obligations is a part of his business life. In cities in the United States, it is often an advantage for a business man to belong to some club; in Buenos Aires, it is not only an advantage but a necessity, because nearly everyone who wishes to be well rated is a member of some club. The salesman who has social knowledge and understanding of human nature needs no advice in regard to the little details of personal intercourse with South Americans, for his own tact will prompt him to find the right appeal.

The salesman in the foreign field is really not only a representative of his firm, but also of his country, for in many inland towns the only acquaintance the people have with the United States is through the commercial representatives. Upon the tact, courtesy, and understanding of the salesman to South America, therefore, hangs, to a great extent, the reputation of all the people of the United States.

The J. D. Collins Sales & Engineering Company, Atlanta, Georgia, announce the removal of their North Carolina office from Raleigh, N. C., to Charlotte, N. C. This organization originally sold only "handling equipment," that is, they endeavored to design and specify that method of handling material best adapted to the work in hand. In this line were included storage battery industrial trucks or tractors, conveying systems, portable elevators or piling machines, as well as a full line of hand trucks including the lift platform type, box trucks, and the plain two-wheel truck. In addition to these items, they have added metal lockers, bins and shelving, and at the present are handling some few staple lines such as Trico, powder filled, renewable fuses, Bond double race ball bearing casters, Lion Paw interwoven belting, and the Enterprise platform and Viche safety toe board or improved gang plank.

Wilson Roby, who is the North Carolina representative of the organization, has established headquarters at 2 Watkins Court, Charlotte, and Mr. Collins, of the Atlanta office, advises that they are considering the possible addition of a representative in South Carolina in the future.

A revised bulletin showing the list of research laboratories in the United States, including consulting research laboratories, has been issued by the National Research Council, 1701 Massachusetts Ave., Washington, D. C. This new list contains the names of nearly 300 laboratories in industrial establishments engaged in research work, giving also the personnel of the research staff and the equipment of each establishment. Other sections of the book give classification of the laboratories according to the subject treated, and an address list of research laboratory directors. Copies can be secured from the Council at the address given.

The Tandem Use of Creighton Openers

BY JAMES ROBERTSON.

There is coming into vogue among cotton mills a more thorough study, understanding and use of the Creighton opener—a machine that is being exploited to the fullest extent by those who are seeking to take advantage of the modern trend of thought in picking and cleaning. The Creighton opener has been long used by the American manufacturer as a single unit. But its cleaning effect, its thorough airing and quick conditioning of the cotton, its opening qualities, have been only partially appreciated. Lately the same idea has been worked out to a more extended degree than ever before.

Most mills mix by the pile system or the hopper system. The pile system is familiar to all—the building up of a large pile of cotton consisting of layers of cotton, sometimes intermixed with waste and then cutting down through this pile gathering a mix of cotton from all the bales used in the mix.

Some mills feed direct from the bale to the hopper from several different marks. This piling system is primarily for the variety obtained in the mix and also to assist the conditioning of the cotton by the atmosphere. This ageing or airing is deemed more important in some foreign mills than in our own domestic plants. Certainly it is reasonable to think that when cotton is allowed to stand that it will assume the conditions of humidity that nature meant for it to have.

This conditioning by the old method is, however, quite expensive, cumbersome and requires considerable room and floor space. If the mill is a large one it would involve quite an expenditure of space needed to mix by the pile system. It is the purpose of this article to show that these results of conditioning, with added cleaning and opening, can be obtained by the use of Creighton openers in tandem.

At one mill the writer has in mind, it had been customary to stop all the cards Monday afternoon and use the hands to prepare the cotton pile. During this time a loss of production was experienced and it was necessary to push the cards the remainder of the week to keep up, whereas with the present use of Creighton openers in the manner described in this article, a good mix is obtained and without the usual Monday stoppage.

An illustration of the dual use of Creighton openers in tandem is shown in Figure 1. The hopper is the usual modern apron style, (A) being the apron of a hopper opener or apron opener. The cotton is placed around this apron, using as many marks as possible. Anywhere from eight to twenty marks or bales can be used. A layer is taken from each bale and placed upon the apron in the form of a roll which is easily formed directly on the bale by rolling up a layer from a bale and placing it on the apron. This will unroll as it comes to the hopper (B). The apron (A) moves and stops automatically according to the amount of cotton in the hopper (B). Hopper (B) has an apron with a weight attached which pushes the cotton against the traveling apron, getting a good opening here.

The cotton is fed into the Creighton opener (C_1) by the suction of air through the feed pipe. All this suction and airing and beating has a very good influence upon the cotton, for we know that the cotton is loosened up and aired by the action of the Creighton (C_1).

In this Creighton, most of the sand and heavy dirt or impurities are removed. The character of the waste taken out is absolutely free from good stock. Waste taken from this machine was later put through a picker waste machine, and it was found that 87 per cent of this waste was entirely dirt and the remaining waste or 13 per cent showed pieces of leaf, stalk and bolls, together with motes and other forms of impurities. Following are given the results of a complete test of waste on both Creighton openers and their subsequent cleaning of the waste made in a picker waste machine:

Test for Waste Made on Creighton Openers in Tandem.
Date: June 22, 1921.
Grade of Cotton: Middling.
Total Weight of Cotton Opened, 10 Bales (5,095 lbs.)
Waste from No. 1 Creighton, 33¾ lbs. or .675 per cent.
Waste from No. 2 Creighton, 17¾ lbs. or .354 per cent.

Total Waste .....51½ lbs. or 1.029 per cent.

These tests on the Creighton openers were carried out further by running the waste made on the Creightons through a picker waste machine, with the following results:

33¾ lbs. of waste yielded 4½ lbs. of motes or 13.3 per cent. (Remainder was dirt.)
17¾ lbs. of waste yielded 3½ lbs. of motes or 19.7 per cent. (Remainder was dirt.)

We might assume that when the cotton has left the first Creighton opener that it is now sufficiently opened to be readily acted upon by the pickers. But it has been proven that the additional action of a second or third Creighton has a range of influence as wide as the first Creighton had.

No. 1 Creighton takes the cotton and by the suction of the air and the beating of the cotton against the grid bars

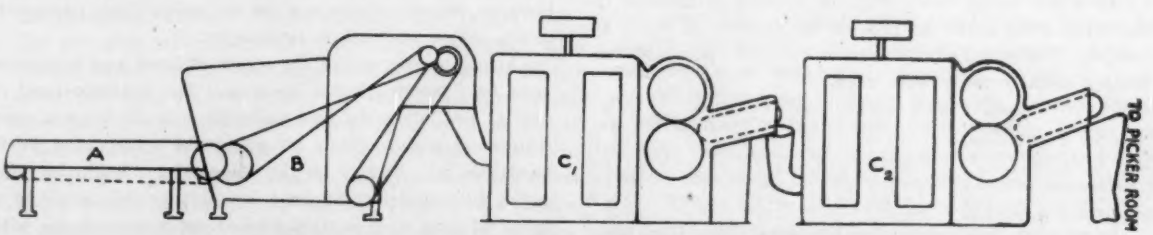


Fig. 1. Arrangement of Hopper and Creighton Openers in Tandem.

or perforated screen the cotton is opened to an extent where it is stringy but has no remaining large tufts left. All the heavier impurities of sand, dirt and some stick and leaf have been removed. Here the greatest percentage of waste is taken out, according to weight.

No. 2 Creighton begins to function in an entirely different manner. The cotton has already been opened to a fairly thorough degree. Upon entering the chamber of the second Creighton the cotton is already in a loose state and the second influx into a rapidly moving current of air, together with a further beating, thoroughly subjects the cotton to a rapid mix and conditioning that even the pile system cannot match for evenness of conditioning and thorough mixing of the various marks used.

No. 3 Creighton adds still further to this mixing and conditioning. The character of the waste shows motes and leaf of heavy character similar to No. 2 Creighton. It

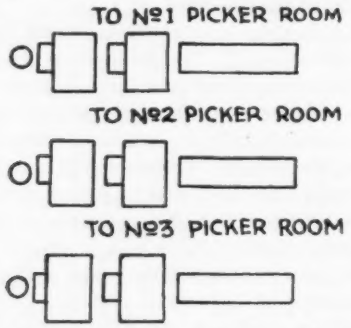


Fig. 2. Floor Plan of Three Sets of Creightons in Tandem Piped to Three Separate Picker Rooms.

might be stated that all impurities cannot be taken out, but anything outside of light leaf or thoroughly matted motes can be readily extracted without injury to the fiber.

It has been possible by using this system of opening to use only two processes of picking instead of the usual three processes, getting as a result far better laps than were secured formerly, using three processes of picking and no Creighton opener. Much discussion has been made as to the use of two processes of picking and with the advent of the tandem Creighton it has become a reality, with a marked improvement. This elimination of one process of picking readily eliminates the hands used to run these intermediate pickers, and a substantial saving is made, provided that the cotton is fed into the Creightons by hopper and from the Creightons to the automatic distributing apron of the breakers.

The amount of waste that is extracted by the Creighton openers in tandem is important, for this seems to vary with different makes and speeds of beaters, together with the use of grid bars and interchanging with perforated metal screen.

In a mill using two Creighton openers in tandem, the following table shows an idea of the amount of waste extracted. The speed of the beaters was 575 r.p.m. and perforated metal screens were used.

	Grade of Cotton	No. 1 Creighton % of Waste.	No. 2 Creighton % of Waste.	Total Waste.
Test No. 1	Middling	.70 %	.39 %	1.09 %
Test No. 2	Middling	.675%	.354%	1.029%
Test No. 3	Middling	.834%	.439%	1.273%
Test No. 4	Strict Low	1.070%	.583%	1.653%
Test No. 5	Strict Low	1.203%	.524%	1.727%
Test No. 6	Strict Low	1.140%	.712%	1.852%

In another mill the writer has seen three Creightons in tandem, and figures show that the following tests give the information listed below:

1. A beater speed of 800 r.p.m. gives less waste than a beater speed of 450 r.p.m.

2. Grid bars greatly increase the amount of waste made, over the use of a perforated metal screen.

3. A speed of 800 r.p.m. of beater on the first Creighton, 600 r.p.m. on the second Creighton, and 450 r.p.m. on the third, gives the highest percentage of waste over the adoption of any one speed for all three beaters.

4. The ratio of the amount of waste made in the three Creightons is approximately 3 : 2 : 1. This means that No. 1 Creighton takes out three times as much waste as No. 3, but this waste is of a different character.

It is certainly true that the tandem use of the Creighton opener will mean a step forward in the art of cotton manufacture. Certainly it has proven its worth in opening and cleaning cotton together with a thorough mixing and conditioning.

In conclusion, the writer wishes to call attention to the use of humidity in this opening room where the air drawn through the Creighton openers and conveying trunk contains about 60 or 65 per cent relative humidity, conditioning the cotton thoroughly before it reaches the card room.

Credit Granting and the Business Cycle.

H. S. Dennison, president of the Dennison Mfg. Co., in a recent issue of *The Credit Monthly*, says:

The value of a study of the business cycle is being appreciated by an increasing number of business men and bankers. A great service has been performed for the business community by Edwin F. Gay, formerly Dean of the School of Business Administration, Harvard University, who has been publishing in the New York Evening Post, now under his management, a series of articles on the business cycle. Contributions to this series were made by such economists as Prof. Wesley Clair Mitchell, Prof. Edmund E. Day, of Harvard, and Prof. Edwin W. Kemmerer, of Princeton. Equally sound articles were contributed by business men who had actually governed their business successfully according to the principles set forth by the economists. In these articles the importance of a study of the business cycle to all departments of the business was noted.

In order to control the business cycle every department —production, plant development, company financing, purchasing, advertising and credit granting—must cooperate.

The undue extension of credit at the peak of prosperity and the undue restriction of credit in the depth of depression run counter to sound business, because such credit granting takes no account of the cyclical movement of business. The credit department is in a pivotal position to control the extreme fluctuations of the business cycle by policies of credit granting based on the outstanding fact of business movement—namely the movement from prosperity to depression and back to prosperity.

Any flattening out of the curves of peak and depression must tend towards better business. The unemployment of capital and labor, the vast suffering attendant upon every depression which affects all groups of society and works hardships particularly on the wage-earner, might be eliminated in large part at least by putting into practice a policy of long time control worked out in accordance with the experience of the business cycle.

Popular Textile Chemistry

BY JAMES A. BRANEGAN.

PRESIDENT KALI MANUFACTURING CO., PHILADELPHIA.

Chloride of Lime and Chlorine Bleaching Chemicals.

In the bleaching of cotton no chemical is more universally used than chlorine and its salts. The most conspicuous of these is Chloride of Lime or Calcium Hypochlorite to give its technically correct name. The chemical molecular formula for chloride of lime is $Ca(OCl)_2$ meaning each molecule contains one atom of Calcium (Ca) joined to two atoms each of Oxygen (O) and Chlorine (Cl). There is no figure after the Ca which fact in chemistry usually signifies one atom—the OCl is the radical of Hypochlorous Acid (HClO) and as two parts of this acid radical are developed and combine with the calcium in the manufacturing process we write it $(OCl)_2$, the small "2" after the parenthesis signifying that every element enclosed by the bracket is taken twice. In the manufacture of chloride of lime the first essential is cheap electrical power as it is by electrolysis we produce chlorine, the most essential element in this class of compounds. The cheapest source of energy we have today is water power as expressed by falling water and for this reason our chlorine industries are located in the vicinity of falls or running water which permits damming. At a later period the sun's rays and tidal power will undoubtedly be developed, but at present water remains our cheapest source of power.

Common salt or Chloride of Sodium has the chemical formula "NaCl" meaning each molecule contains one atom of Sodium (technical name Natrium, from which we get "Na") and Chlorine (Cl). The process of separating chlorine from sodium chloride by electricity is simple to describe but difficult in practice on account of the great care that must be exercised in controlling the operation. Common salt (Sodium Chloride, NaCl) melts at about 770° Centigrade (1418° Fahrenheit), and when melted and kept at this temperature becomes a good conductor of electricity. Now if a strong current of electricity is passed through this fused sodium chloride it breaks up into the two elements metallic sodium "Na" and Chlorine gas "Cl." The metallic sodium being light floats on top of the molten mass and is removed at once by various methods (usually by alloying with molten lead) while the chlorine gas is carried on to the chlorinating chamber where the "bleaching powder" (Chloride of Lime) is manufactured. The metallic sodium (Na) mentioned above is further processed which adds one atom of Oxygen and one atom of Hydrogen and converts it into Sodium Hydroxide (NaOH) this being the technical name for caustic soda used in the bleachery and dyehouse. Common lime is calcium oxide (CaO) meaning one atom of calcium and one atom of oxygen. This lime is slaked with a small amount of water (about 25 per cent) and after cooling is sifted in the chlorinating chambers until it covers the floors to a depth of four inches. These chambers are usually seven or eight feet high. The chlorine gas is slowly admitted to the chambers from above and is gradually absorbed by the lime which, if the process is conducted carefully, will take up 35 per cent of chlorine. If the lime is heavy or lays too deep on the floor, the workmen enter, properly equipped with gas mask, and rake the mass over. When the reaction is complete the bleach is shoveled into wooden casks or iron drums. The chambers must be kept cool and the chlorine gas must be dry and mixed with a fixed amount of air. The chambers are arranged in series and any chlorine gas which does not enter into the reaction in the first chamber is carried to the second and so on until all is absorbed and there is virtually no loss of chlorine. As already explained lime is Calcium Oxide (CaO) and after this is slaked and absorbs the chlorine it becomes Calcium Hypochlorite, $Ca(OCl)_2$, meaning one atom of calcium and two atoms each of oxygen and chlorine and this calcium hypochlorite, usually called chloride of lime, is the "bleach" which is used in great quantities for the bleaching of cotton yarns and fabrics. This bleach process we will describe further on.

Sodium Hypochlorite is another form of chlorine salt which is used for bleaching but not to the extent of the calcium salt (Chloride of Lime). The chemical form of Sodium Hypochlorite is NaOCl meaning one atom of Sodium (Na) one of Oxygen (O) and one of Chlorine (Cl). This salt is not as stable as the calcium hypochlorite and the bleacher makes it as needed. The chlorine gas manufactured by electrolysis from salt, as described in the early part of this article, instead of being passed over them, is liquefied by cooling and pressure and forced in this liquid state into iron cylinders. In this condition it is received by the textile bleacher who wishes to manufacture the sodium hypochlorite. A large earthenware crock or a concrete box is used for making sodium hypochlorite. Some workers use Soda Ash, others Caustic and some use a mixture of both. If straight Soda Ash is used the following proportions have been found best.

Water	100 gallons
Chlorine	25 pounds
Soda Ash 58 per cent	90 pounds

If straight caustic soda

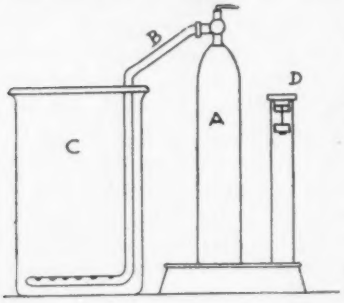
Water	100 gallons
Chlorine	25 pounds
Caustic Soda	32 pounds

While if a mixture of the two is used it should be

Water	100 gallons
Chlorine	25 pounds
Soda Ash 58 per cent	45 pounds
Caustic Soda	16 pounds

In all cases the alkali is dissolved in the water first and the chlorine added when cool. If caustic is used there will be a generation of heat, in which case it is best to slow down or stop entirely until the temperature subsides. After the caustic soda or soda ash is dissolved, the chlorine gas is allowed to flow from a cylinder by its own pressure through a perforated tube which runs to the bottom of the crock or box. The gas must be run slowly and the liquid kept cool so that every bubble is absorbed before it reaches the top. When the caustic soda solution will no longer absorb chlorine the reaction is complete. The amount of chlorine added to the caustic soda can be estimated by placing the cylinder of chlorine gas on a small platform

scale while running the gas into the soda. When the reaction is complete the loss of weight will show the amount of chlorine gas delivered from the cylinder so any amount desired can be used. It should be mentioned that the cylinders are provided with a gas proof cock and after this is closed the delivery tube can be disconnected. The illustration shows the simplicity of the apparatus.



A—Cylinder of Chlorine Gas.

B—Delivery tube provided with small holes to allow gas to escape.

C—Stone Crock.

D—Platform scale.

The reaction is expressed in chemistry as follows:

Caustic Soda		Chlorine Gas		Sodium Hypochlorite		Salt		Water
$2NaOH$	+	Cl_2	=	$NaOCl$	+	$NaCl$	+	H_2O

From this reaction it is seen that two molecules of caustic soda ($2NaOH$) combine with two atoms (Cl_2) of chlorine to form one molecule of sodium hypochlorite ($NaOCl$), one molecule of salt ($NaCl$) and one molecule of water (H_2O). The proportion previously given for practical purposes has an excess of caustic or soda ash as it is necessary to have this excess in order to preserve the solution. Where it is necessary to produce large quantities of sodium hypochlorite quickly and economically an absorbing tower is used. This is simply an earthenware receptacle of about 30 inches diameter and 8 to 10 feet high. These towers are made in sections and are filled with earthenware rings, stones, broken pottery or any material which will break or obstruct the gas bubbles as they float upward through the caustic soda solution. This tower is filled with caustic and the gas allowed to bubble through. The strong sodium hypochlorite solution is drawn off from the bottom and fresh water and alkali added at the top. The advantage of a tower of this kind is readily understood when it is known that the chlorine gas as it enters the caustic solution forms bubbles and these bubbles are slowly absorbed as they ascend upward through the caustic, getting smaller and smaller and finally disappearing altogether. Therefore, the smaller the bubbles and the further they have to travel in their ascent the more complete the reaction. The high tower and the pottery rings furnish these conditions. If the bubbles are not entirely absorbed they break on the surface, the gas is lost and the surrounding air poisoned. This is a very bad condition and should be avoided. It was chlorine gas delivered from cylinders which the Germans used in their first gas attack.

Sodium hypochlorite can be made by the dyer directly from salt and there are several electrical machines for this purpose on the market. They usually consist of a series of cells and the electrical current is so arranged that the salt in solution passes first into Cl and soda and then into sodium hypochlorite. This apparatus is very delicate and needs careful attention, it being necessary to make frequent analytical tests of the various solutions and also the voltage must be watched.

In using chloride of lime and sodium hypochlorite two general processes are followed. In the first method the goods are boiled in the kier with caustic soda and soda ash to which may be added a good boil salt, a soluble oil, a Turkey red oil, or soluble oils containing terpenes. The object of adding these "assistants" is to overcome the capillary action of the waxes in the cotton and also to emulsify the mineral oils picked up in the knitting or weaving process. The amount of chemicals used in the kier boil varies with the grades of goods and condition, the quantity, however, is rarely over 8 per cent and usually less. Some kiers are open at the top but the larger and more up-to-date kiers are closed and the boiling solution is kept in circulation through the goods. These are called "circulating kiers." Large kiers are made of iron and should have a number of coatings of kalsomine inside so that the iron will not come in contact with the goods. After the goods are thoroughly cleaned in the kier and rinsed they are put in the bleach liquor (chlorine). This bath is cold and about 1 to 1½ degrees Twaddle. The goods are thoroughly saturated with the bleach and then soured in a cold solution of sulphuric acid 1 degree Twaddle. They are again washed and tested with "indicator paper" made by soaking filter paper in potassium iodide and starch. If any chlorine is left in the goods the "indicator paper" which is white will turn color. Any chlorine left in the goods is very dangerous as it gradually acts on the goods causing them to become tender. This weakening of the fiber frequently does not appear for weeks after the goods are bleached. For this reason the last traces of chlorine should be neutralized. There are a number of good neutralizers on the market and as very little is required the cost is small. The foregoing bleaching process is a general outline which varies considerably in practice. In some cases it is necessary to give the goods a boil in milk of lime before souring. This is known as the "lime boil." Also a number of bleachers are substituting muriatic acid for sulphuric acid with good results as the lime salts which form in the fiber from muriatic acid (Calcium Chloride, $CaCl_2$) are soluble while those salts from the sulphuric acid (Calcium Sulphate, $CaSO_4$) are insoluble and if any calcium is left in the goods it sets like plaster paris (plaster paris is Calcium Sulphate) and gives the goods a harsh feel. In all cases a chlorine neutralizer should be used.

In the bleaching of textile fabrics the chloride of lime bath (chemic) and the acid bath (sour) are usually tested with a twaddle hydrometer. The ordinary twaddle hydrometer, however, is not delicate enough for a proper testing of the baths. The common hydrometer has a range from 1 to 20 degrees over a small space of three or four inches and as the liquors "creep" on the instrument it is practically impossible to read within one or two degrees of accuracy. There is now on the market a special bleach hydrometer which has a scale of only one to three degrees over a form with a spindle. Even at a distance the degree of the bath on this hydrometer can be read to one-tenth of a degree. If the bleacher has technical training the chlorine bath or chloride of lime should be tested for chlorine by checking against a standard solution of Arsenious Acid. Even the man without any technical training can make this test after a little practice. This test is more accurate than the hydrometer as it indicates the actual *chlorine* while the hydrometer merely shows that the water has *something* dissolved in it.

The next article will be on soaps used for textile purposes.

Six Definite Things That Workers Want

6. To Throw Down Roots

BY JAMES H. COLLINS.

There is a story of an Irishman who dug in a ditch all day for a dollar and a half, and on his way home stopped at a gambling house. Throwing all his money on the table he lost it at the first turn of the wheel.

"Aw, well—easy come, easy go!"

So long as a worker's job is uncertain and he may find himself on his way to another factory or another town tomorrow, he thinks of money in pretty much the same way, living up to his earning capacity as he goes.

But stabilize his job by the methods described in these articles, demonstrate that there is justice and humanity in management, broaden his viewpoint and his opportunities, and the next thing he will want to do inevitably, is save money. Income has been made regular, and that makes it possible for him to systematize his expenditure, allowing a margin for saving. If he likes his job, he will probably like the community in which he works, and want to take root in it. If a single man, he will marry and settle down. If he is married he provides a better place for his family to live.

The whole viewpoint fits right into thrift, life insurance, the purchase of a home and good personal management of money.

In this connection, the employer has opportunities to advise, at least, and to help, if he wants to go that far—as many of the largest corporations in the country are doing today.

In a Middle-Western industrial town, during the war boom, while rents were rising and fortunes being made in real estate, a slick promoter quietly got busy among the employees of a small factory. He assured them that they could make some easy money by purchasing a group of old houses, dividing them on the two-family plan, letting half to tenants, and practically getting their own rent free. A corporation was formed into which some of the workers put every dollar they possessed. The promoter made one payment on the property and disappeared with eight thousand dollars. Several of the workmen, officers of the corporation, were arrested, and one came near going to jail for technical theft of money that he had merely passed from a stockholder to the president.

Such occurrences are very common, and they show better than anything else how insecure are the savings of the average wage-earner. The manufacturer for whom these swindled people work knows most of them personally. A few words of advice from him would have scotched the real estate swindle in the beginning. His advice was not asked for, however, and he knew nothing of the fraud until called upon to get his employees out of legal trouble.

Many a corporation now selling its own stock to employees on installments began doing so because employees asked the company to provide a safe place for their savings. An employer may hesitate at becoming a savings banker for his employees. Fortunately, it is not necessary for him to go that far if he doesn't want to. As an advisor, he may help employees select trustworthy banking institutions, help them become their own bankers, and facilitate thrift through payroll conveniences such as withholding a percentage of wages when requested, and attending to the routine of making deposits for them.

Most people know that they ought to save money. But they want to be put under some compulsion until saving becomes a habit. In fact, they like to be taught thriftiness, just as they would be taught to read a blue print. The first thing to be taught in thrift is regularity. In purchasing installment goods, buying a home, subscribing to shares in a building and loan association or a credit union, people establish an obligation that requires regular payments. In making these payments, they get the thrift habit.

A group of loan banks lending money to wage and salary earners turns this trait to account. A borrower wants $100, say, to buy some furniture. He gets the money from the loan bank, agreeing to pay back $2 a week, which clears off the debt in one year. Instead of paying directly on the loan, however, he pays on a $100 "investment certificate." At the end of the year he can use this investment certificate to pay off the loan, or may keep it, paying the loan separately if he has other funds. Experience shows that many borrowers prefer to keep the investment certificate which earns five per cent interest, or if this is not possible, they immediately begin buying another investment certificate, continuing the habit they have acquired of setting aside so much money weekly.

This natural tendency of people to save money systematically, once they have started, and the surprising ability of working people to manage their own financial affairs, can be made the basis for a cooperative bank in almost any factory, shop or office where as many as twenty-five people can be brought together. An employer need go no further than a little leadership at the outset—shown how to organize and manage, his employees will do the rest themselves.

The cooperative bank has been thoroughly worked out in all its details, and is successfully operating in many industrial establishments. Called the "credit union," it provides facilities for regular saving, yields interest on money, and also enables members to borrow in emergencies. It is not only a cure for loan shark troubles, which are the unsuspected cause of much discontent and slackness in many a work-force, but is a stabilizer where labor turnover is high.

For years it was assumed that telegraphers were natural tramps, roaming from city to city. The turnover in one big metropolitan telegraph office was enormous. When a credit union was organized in that office, hundreds of shifty employees settled down in steady jobs—much of their roaming had been done to get out of tangles caused by borrowing money at extortionate rates of interest.

Full instructions for organizing and operating a credit union can be had for twenty-five cents in "A Credit Union Primer," published by the Russell Sage Foundation, New York City. Even the books and forms can be purchased ready-made. Briefly, a number of employees come together,

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organize a cooperative association, pay a small entrance fee, and buy one or more shares apiece, paying for them in weekly installments. The shares may have any value that seems best, and installments can be arranged according to conditions. Five-dollar shares at ten cents a week are paid for in a year, at the end of which time interest or dividends are paid, and new shares bought. Should a member wish to borrow money out of the fund thus created, he does so on his note, continues paying on his shares, and also begins paying off his loan by installments. Money can be borrowed in this way for reasonable rates of interest, in most cases six percent, and as there are only nominal expenses for stationery, the officers giving their services voluntarily, shareholders get something like five per cent interest on a six per cent loan basis, the cooperative bank usually paying at least one per cent more than savings institutions in the same community.

The building and loan association is another cooperative thrift organization for home building, successfully conducted by employees in many an industrial plant, and requiring no more participation on the part of the employer.

Many employers still feel that the establishment and management of thrift institutions by themselves, for employees, is in the nature of interference with their private money affairs, and likely to cause complications, as well as burdensome detail. This even goes the length of refusing to make thrift deductions from pay envelopes.

But other employers are active in providing thrift facilities, such as installment sale of their corporation stock to employees, a thrift plan that has stood more than twenty years test, and which is being adopted by some of the largest and most conservatively managed corporations in the country.

Whether he prefers to hold aloof, or to provide thrift facilities, an employer has a choice of plans that range from the giving of advice to becoming a depository for his employees' savings. The encouragement and teaching of thrift is something that workers clearly want, and thrift leadership is a benefit to themselves, to the concern for which they work, and to the community in which it is established.

[This article is the sixth and last of the series by Mr. Collins.—Editor.]

Co-operative Management*

BY ROBERT W. BOYS,

AGENT, THE MANHASSET MANUFACTURING CO., PUTMAN, CT.

If you will look up your Websters, you will find the word "Cooperative" to mean "operating jointly to the same end" or "The act of working or operating together to one end"—"joint operation."

The question of cooperative management has appealed to me as one of the most vital and interesting questions in the world today. It is a question that every employer of labor should be giving his close personal attention and study, this relation between the manager and his foreman and between the foreman and the employees directly responsible to him.

I have spent the past thirty-eight years in cotton mills —the first twelve years in England and the last twenty-six years in Canada and various parts of New England. I have passed through the various stages from operative to second hand, overseer, superintendent and agent and for the last ten years I have been responsible for the operation of a large plant with complete village, including church, school, club and general social and welfare organizat a, so I have had an opportunity to put into practice my ideas on cooperative management.

In the first place we must try and keep our mills clean and healthy—then we must keep our machinery clean and in perfect operating condition and also see that our overseers are competent and properly trained and instructed to manage the operatives under their charge and see that every one gets a square deal and uses common sense and good judgment.

The principal factor in good management is to produce goods of quality at a price that will meet the keenest competition. There are many things to consider in bringing about this result. Every operative must do his part in a thorough manner or the product suffers in the next operation.

Let us start with the bale in the opening room. The overseer of carding will see to it that the cotton is of grade and staple to the type purchased. He will see that it is properly blended or mixed and when the stock is going through the pickers he will have a very thorough system in testing out his weights by the yard as well as the lap so that he will present to the card a well made, even weight lap. Then he will see that his cards are in the best possible condition to handle the cotton and set in accordance with the staple and character of the cotton to be run. He will then make periodical tests to find out his various waste percentages.

I have found many mills very lax in this particular. Cards running the same stock differing in waste percentages at different cards as much as two or three per cent, and often you will find different grinders with the same instructions as to setting responsible for this variation. The loss through carelessness on the cards can so increase the cost of manufacturing as to practically put the mill out of the running in a close competitive market.

We pass along to the sliver lap and ribbon lap machine where we must insist on great care being taken to see that the machine is not running with one or two slivers short, due to stop motions not operating, the same rule holds good with the ribbon lap. We all know that an uneven lap produces an uneven sliver at the comber and passes it along to the drawing. Waste testing at the comber is a very important matter and needs the greatest consideration. I would advise a waste test to be made at each comber at least once every twenty-four hours of running time. It will well repay for the time and trouble. Then at the drawings the same care should be exercised in the setting of the machine and in looking after the proper operation of the stop motions. Sizings should be taken from each frame about every two hours as it is of vital importance that the drawing slivers are of the correct weight to present to the slubber. Then as the stock is passed through the speeders, we should see that we have correct drafts

*An address presented before a group of mill men at New Bedford on February 16th.

and twists and that the machines are kept clean to prevent, as far as possible, the slubs and bunches so objectionable in any kind of yarn or fabric. So we pass along to the spinning and we all know if the roving is right we do not have much trouble producing a good even strong yarn, but many points are up to the spinner. He must see that his rolls are set correctly for the length of staple and that he has the correct twist. He must also look out for doubles and singles and see that proper piecings are made when roving runs out and also see that spinners do not make unnecessary waste by taking out roving with one or two rows left on bobbin. Then the spooler tender should avoid kinks and build spools that will not give trouble to the warper.

In warping, the warper operator must look out and not cross ends when piecing up broken ends. We also are all aware of the fact that well manufactured yarn will run well at the warping and any good mill man can get a very good idea of the quality of workmanship in all previous operations by looking over the work as it passes through the warpers. Then there is the slashing or beaming before passing to the weaver.

The weaver handles the product of the mill, takes all the faults that have happened in all previous departments, and must produce first quality goods or stand the consequences and we all know what the weaver is up against, many times due to uneven yarns, soft warps, poor filling, yarn rotten by dye, etc.

Now I have not gone over these various operations of cotton manufacturing to educate you as I know you are thoroughly posted in this regard, but I want now to see what can be done in regard to the efficiency of these operations.

I believe every operation after leaving the cards can be put on a piece work basis to the benefit of the operative and the mill.

I have found in my experience that a great many day-pay operations are only 50 per cent efficient. We also know that it is far more important to have an incentive to produce and it is not good practice to consider a group of operatives as being all equally capable and those most efficient should receive correspondingly more remuneration.

It is to the interest of all to keep the wage scale up to the fairest levels but it is as impossible to keep a wage scale up and production down as for Mrs. Partington to hold back the sea with a broom. By labor's intelligent cooperation the volume of production largely depends.

To illustrate this I recently had an operation that utilized twelve girls. Their work was to tie over a warp at the back of a loom weaving cord fabric from spools. When their spools went empty these girls went in, cut the threads, took out 1500 spools, replaced them with full ones, and tied them up ready for the weaver. It took the girls one hour and forty minutes to complete this operation on day-pay and they were receiving $17.50 per week. We had another group of girls splicing the cable threads 23-5-3. The tieing-in operation was somewhat strenuous while it lasted while the splicing job was very easy and tedious. By combining these two jobs it kept all the girls busy instead of waiting for the spools to run empty at the looms. We arranged a piece work rate and had two groups of girls, ten in each group, and when two weeks later a time test was made, the ten girls were completing the operation of tieing-over the 1,500 spools in forty-five minutes, while on a day pay basis twelve girls were using up one hour and forty minutes. Combining the two jobs the girls raised their pay from $17.50 to $22.50 and the most efficient as high as $26.00. We also reduced the cost of these operations 25 per cent besides the increased running time of the loom.

I have found the same condition to a more or less extent where changes have been made in other operations. I would like to mention another important point in management.

As far as possible make a complete job for an operative.

For instance, in some mills a loom-fixer will have a section of looms but there will be men to take out the empty beams and bring full beams and other men will start up the warps. I would give a loomfixer a section and he does everything there is to do on that section unless changes of styles making extra work by calling for a change-over. By following a system of this kind it is much easier to place responsibility.

In our twisting department we formerly had a set of twister tenders and doffers. We changed our system and established a piece-work rate where the twister tenders did their own doffing, which increased our production, reduced our cost on this operation, and the twister tenders were able to earn from fifteen to twenty per cent more.

There are many studies that can be made along these lines that will prove of benefit to all concerned. I know of one plant where a new manager, by applying the piece-work system over the day-pay system he found in force when he took hold, was able to save his company $250,000 a year, and in most cases operatives' wages were very materially increased. If improvements in processes and in management increase the output per man per day, wages will not have to decline so far as prices.

Now a word about cooperation to attain these ends.

When you have made a study of an operation and you want to make the change, you must have the cooperation and confidence of your work-people to put it across, and along these lines I have always organized what I call my factory council. This council consists of the heads of the various departments who meet weekly or whenever the occasion requires. At these council meetings the various matters pertaining to manufacturing are discussed. Sometimes we will discuss the subject of humidity, waste or any question of improvement. Sometimes they are carding problems—other times spinning or weaving problems and during these discussions the overseers are getting a broader viewpoint and are more valuable men for the knowledge thus gained and in time they are fitted for more responsible positions.

The overseer is the man closest to the operative and it is to him we must trust to put our ideas of improvement into the organization, so it is very important that he thoroughly understands your methods and believes in them. The cards must be face up on the table and a square deal policy used on all occasions. I find when these meetings are first organized it is very difficult to get the men to express their opinions or say anything about any trouble one is having with the product from another overseer's department, but when each man gets it into his head that these discussions are for the general benefit of the organization he does not hesitate and usually the trouble is

remedied. The question of policy in regard to management can be decided at these meetings so that the various departments do not have a general policy decided by each overseer.

This policy should always adopt the principle of a square deal throughout the mill. A great many labor troubles can be avoided if the overseers will follow up the petty grievances that come up from time to time and have them remedied or bring them up at the council meeting for a decision.

Occasionally we will have a talk on costs and the subject will be introduced by the man who makes up the costs of the various departments. It is usually of interest to the overseer to know what is included in his costs so he may find a way to eliminate some of this expense. We also give to each overseer, monthly, a record of the cost of his department including his waste percentage and cost per pound of material and supplies and power cost. If he is a good overseer he will be constantly making a careful study of how he can reduce the various factors that enter into his costs.

The question of welfare work has had the attention of mill men for many years and has been adapted by many to a more or less extent depending on whether the mill is located in the country or a city. But however far this is carried it should be put, as far as possible, on a self-supporting basis. I don't believe our New England textile operatives care for anything on the lines of charity, but where a mill club can be organized and managed principally by the operatives it can be the means of a closer cooperation. An annual field day or dance can be successfully carried out. It gives the operatives a better chance to get acquainted with each other.

If these things are handled properly it usually brings a more desirable feeling of confidence toward the management.

Another important point in cooperative management is for the overseer to systematize the education of his operatives, to see they thoroughly understand their work, and advise them just what the result of any carelessness means in the next operation or the final product. We cannot get cooperation by simply "raising cain" when we see anything going wrong. A few words to such an operative will in most cases result in greater care to avoid repeating the same mistake and you usually gain their interest and respect, whereas, by giving them a call down you have left them as ignorant as ever and very often made an enemy or a dissatisfied operative.

This same question applies to the superintendent and overseer. I once worked for a man who had a definite set policy of finding some trouble in the various departments every day so that he could have a row with each of his overseers. His idea was to keep them keyed up to the highest pitch and keep them guessing whether or not they were going to lose their jobs. The result was that we were all doing all in our power to get another job and get away from this everlasting fault finding. No success can ever come from this method of management. You can never get cooperation with such a system. It is the easiest thing in the world to find fault and you can always find things in any fellow's department to criticize but to get cooperation I believe it better to talk over these troubles in a more friendly way and advise him, or make suggestions where he might eliminate his troubles, and usually he will go to it and find a remedy and report its success.

I certainly would not want a man if it was necessary to be eternally finding fault, or have to be constantly pointing out carelessness in his department. He would certainly be either lacking in knowledge of his department or too lazy or indifferent to keep his department up to standard.

I certainly believe that by following out a careful system of cooperative management we can develop a class of more contented and efficient operatives and get away to a very great extent from many of the labor troubles we are constantly having in the textile industry.

I have tried out this policy for the past sixteen years and found it worked out successfully and have always been able to settle any labor problems without any serious trouble.

Cotton Mill Lighting.

(*Continued from page* 404.)

arrangement. An illumination level of 6 to 12 foot-candles will give the best results. This will mean that where the machines are located in the drawing frame section, a few extra units over these machines to supplement the other lighting system will give the desired results.

Quilling.—The upper table of the quilling machines should be lighted in the same way as the beam end of a warp machine. The past practice of lighting the bobbins under the table with two bare 25- or 50-watt lamps is bad. These bare glaring lamps defeat the very purpose for which they are used, and at all times they should be shielded by pear-shaped "half shades" or some good type of angle reflector that will throw the light onto the bobbins and keep it out of the operators' eyes.

Dyeing.—General illumination of a spacing that will give approximately one lamp watt per square foot of floor area is considered good for dye houses. This spacing means that a 150-watt bowl-enameled Mazda C lamp in an RLM standard dome on a 12-foot spacing between rows, or a 200-watt lamp on a 14-foot spacing, or on a 12 by 16-foot spacing, would approximate one watt per square foot since the 150-watt lamp would cover about 150 square feet, and the 200-watt lamp on either spacing suggested for it would cover nearly 200 square feet.

[This is the final installment of the paper on Cotton Mill Lighting by Mr. Ketch.—Editor.]

"Production and Fair Profits—the Key to Industrial Peace," by James Turner, is a book published by Sherratt & Hughes, 34 Cross Street, Manchester, England. The author, who has been personally connected with the English industry since he was eight years of age, expresses his views on the causes of industrial unrest, and deals with the interrelation of human nature, law and order, ownership of land and taxation, capital and labor, finance, education and insurance in the development of this cause, and suggests the formation of a different system in industry to overcome the undesirable elements and conditions in the industrial system. In this book he presents his arguments and observations on the subject. The work contains 242 pages and the price per copy is six shillings net.

Spinning Tests

To Compare Middling Yellow Stained Cotton With Middling Yellow Stained Bolly Cotton

BY D. E. EARLE (NOW RESIGNED), AND H. B. RICHARDSON.

BUREAU OF MARKETS AND CROP ESTIMATES, U. S. DEPARTMENT OF AGRICULTURE.

The spinning value of bolly cotton in relation to the value of an equal grade of normal cotton has been an open question of long standing. The U. S. Department of Agriculture has run a spinning test which is of interest to textile readers although the results of a single test are indicative only since the grade characteristics of this class of cotton vary widely.

Two bales consisting of Middling yellow stained and Middling yellow stained bolly cotton both one inch in length of staple were tested for comparative wastiness and tensile strength. This cotton originated from the regions near the northern limit of the cotton belt in the state of Texas, one being equal to the other in grade with the exception that one was "bolly." Bolly cotton or "bollies" is cotton containing a large quantity of boll hulls, shale or the inner lining of the boll, pieces of stalk, leaf, dirt, and other impurities sometimes found in cotton grown near the northern border of the cotton belt where cotton does not always have sufficient time to mature. The closed and half-opened bolls are ginned in a "double-rib" huller gin with these rather unsatisfactory results.

The cotton was tested under identical conditions, the results of the waste and tensile strength determination being given in the accompanying Tables 1 and 2 respectively.

These tests showed that the bolly cotton involved was 5.27 per cent more wasty and on an average about 10 per cent weaker than tinged cotton of equal grade.

TABLE 1.

Percentages of waste discarded in the various processes in the manufacture of Middling Yellow Stained cotton and Middling Yellow Stained Bolly cotton into yarn.

PROCESS	Yellow Stained Middling	Middling Yellow Stained Bolly
Pickers (1)		
Dust room	.62	.81
Opener	.41	.79
Breaker	1.10	2.47
Intermediate	1.76	2.81
Finisher	.57	1.10
Total visible waste	4.46	8.16
Invisible waste	2.69	2.53
Total visible and invisible	7.15	10.69
Cards (2)		
Flat strippings	3.09	3.80
Cylinder and doffer strippings	1.41	1.80
Motes and fly	1.74	2.58
Total visible waste	6.24	8.18
Invisible waste	.54 gain	.31 gain
Total visible and invisible	5.70	7.87
Pickers and cards (1)		
Total visible	10.26	15.47
Total invisible	2.19	2.25
Total visible and invisible	12.45	17.72

(1) Percentages based on the net weight fed to opener.
(2) Percentages based on the net weight fed to cards.

TABLE 2.

Breaking strength of yarns in pounds per skein of 120 yards spun from Middling Yellow Stained cotton and Middling Yellow Stained Bolly Cotton. (Twist factor 4.75 used.)

	8's	16's	22's	28's
	Lbs.	Lbs.	Lbs.	Lbs.
Middling Yellow Stained	212.0	86.1	64.8	48.4
Middling Yellow Stained bolly	183.6	83.8	57.9	43.7

Cotton Mill Lighting*

BY JAMES M. KETCH.

Standardized Illumination.

Weaving.—The weave room is generally the first place to be considered for better lighting because it is here that the weavers actually combine the warp and filling to make cloth, and it is here that good light and good vision are needed to make cloth of the quality required by the mill. Poor workmanship in the weave room results in more loss than in any other part of the mill. The weave room illumination should be well balanced as to horizontal and vertical values; the horizontal is needed for cloth inspection, and vertical illumination is very essential when rethreading a broken warp through the harness wire.

The arrangement, mounting height and type of reflector should be such that the back of the looms will be almost as well lighted as the front. In the past, it has been necessary with certain concentrating types of reflectors to put rows of units in the back aisles as well as in the work aisles. However, with most of the present day reflectors, the distribution of light is more of the distributing type than concentrating. By using reflectors having a wide spread of light and properly mounted, both the work aisles where the reflectors are placed, and the backs of the looms in adjacent back aisles may be adequately lighted.

A common arrangement of small looms is in groups of four. Ordinarily these groups are placed so that one unit, such as the RLM dome and bowl-enameled lamp, for each group, Fig. 1, provides good illumination in both the work aisles and back aisles. The mistake is often made of putting lighting units directly in front of the looms in the work aisles, thus placing the source of light in a position where shadows will be cast by the weaver as he leans over the loom. With the lighting unit in the position shown in Fig. 1, the light comes from the side and confusing shadows will not be in evidence.

If the groups of looms are too far apart to use the spacing of Fig. 1, it is well to keep the rows of units in the work aisles with the individual units spaced 10 to 16 feet apart, according to the requirements, in the aisles. Where a unit would fall in front of a loom, the spacing can be increased a little to prevent its falling in a position to cause bad shadows on the work as explained in the preceding paragraph. One possible grouping of lighting units for long looms is shown in Fig. 2.

Bowl-frosted Mazda daylight lamps in RLM standard domes are successfully used in colored cloth weave rooms.

*Reprinted from a paper presented before the Boston Section, Illuminating Engineering Society, October 18, 1921.

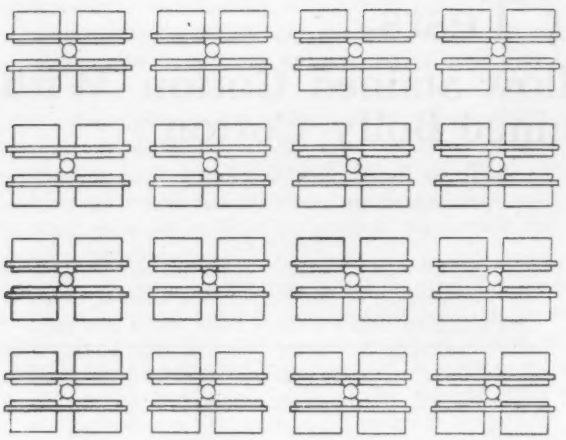

Fig. 1. A Common Arrangement of Four Small Looms in a Group. One Unit per Group Will Give Illumination Values According to the Table, Fig. 2, in the March Number of Cotton.

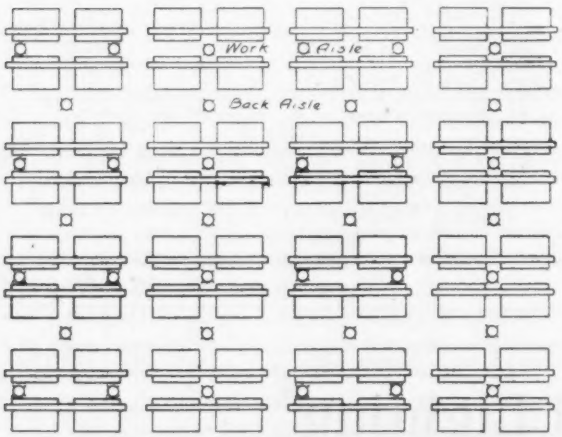

Fig. 3. Jacquard Weave Room Lighting Calls for Rows of Units Both in the Work Aisles and the Back Aisles. This Arrangement Assumes that the Units in the Work Aisles Must Be Hung Below the Board Runway.

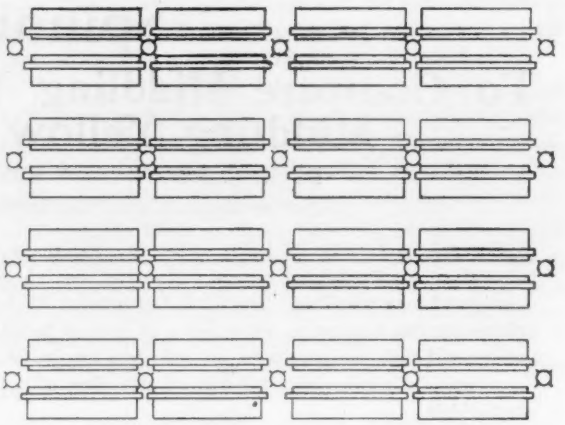

Fig. 2. It is Possible to Obtain Good Lighting in a Weave Room by Keeping Rows of Units in the Work Aisles and Spacing Them by the Figures Given in Table, Fig. 2, Last Month.

Since the bluish filter glass bulbs of the Daylight lamps absorb some light, the next higher wattage Daylight lamps must be used to obtain a given level of illumination on a calculated spacing, than would be required if clear lamps were employed.

Jacquard weaving.—The very character of the figured materials, towels, etc., woven on Jacquard looms demands better illumination than gray goods weaving. Inspection of Jacquard woven materials is also more rigid and exacting. There are very few Jacquard weave rooms of any size where the weavers are able to work, even in part, by natural daylight because practically no daylight can penetrate the rows of high machinery and the mass of warp controls. This means that in addition to the high quality and level of illumination for this fine grade work, the lighting system must be well protected from glare and shadows since it has to be relied upon throughout the day in the majority of Jacquard weave rooms.

In addition to the high light absorbing machines many mills have board runways 7 to 8 feet above the floor in each work aisle to make easy access to the loom work heads. This complicates the lighting problem, because the lighting units must generally be hung below these low run-

Inefficient Reflectors and Insufficient Lamp Wattage, Combined With an Improper Spacing, Make for a Gloomy Interior and Bad Shadows.

By Using a Reflector Having a Fairly Wide Spread, the Backs of the Looms are Almost as Well Lighted as the Work Sides.

ways. The low mounting height requires a special consideration of the glare problem, and also that of obtaining uniformly distributed illumination. In no case should bare lamps, or reflectors having an insufficient shielding angle be used. Many bare lamps have been used and the glare endured in the past, because it was found difficult to get an even illumination on the work plane under the runways with reflectors hung as low as was found necessary. Some thought that when reflectors were used under these conditions, it was necessary to space them too close together. There is a simple relation between the spacing distance between reflectors and the height of the unit above the plane of work or machine bed. This rule says that with the ordinary RLM dome or other direct lighting reflectors, the spacing distance in feet should not exceed 1½ times the height of the unit, in feet, above the work table or the plane of work. An example of this in a Jacquard weave room would be where it was possible to mount the reflectors below the board runway so that the height from the loom bed to the reflector was 6 feet; then, according to the rule, the reflectors could be spaced 1½ times 6, or 9 feet apart without violating the requirements for fairly uniform illumination on the work. At that mounting height, a wider spacing would probably result in uneven and spotty illumination. In those mills where permanent board runways are not found in the work aisles, the reflectors may be spaced farther apart and mounted higher as in other parts of the mill. It has been stated by some mill employees that they could reach in up under the loom head and replace a broken warp control in the dark, however, it is more convenient to use a type of reflector which has an upward component of light. Prismatic, opal bowl, and glass top domes are three reflectors commonly used in textile mills which will assist in lighting the under side of the work head, thus facilitating the work.

Very little useful light can filter through from the work aisles to the back aisles, hence their illumination is to be considered independent of the lighting in the work aisles. Whereas an illumination value of 6 to 12 foot-candles is found the most convenient in the work aisles, a lesser degree of illumination, such as 4 to 6 foot-candles, will probably furnish sufficient light in the back aisles. An exception to this would obtain in mills which use the portable warp tying machines at the looms, thus requiring the higher rather than the lower values here recommended, in the back aisles. The back aisles are not hampered by overhead runways and the units may be mounted 10 to 14 feet above the floor and spaced as in other parts of the mill. An ideal arrangement is to mount the back aisle reflectors somewhat higher than the loom work heads so that some light will be furnished at the work heads when needed. Fig. 3 show an arrangement of Jacquard weave room lighting which has proved satisfactory.

Cloth room.—A general illumination level of 5 to 8 foot-candles is required for the ordinary cloth room work such as folding, baling, and boxing. This should be sup-

This Denim Weave Room Uses One 75-Watt Lamp in an R L M Dome Over Each Loom. The Unit is so Situated That Light is Thrown on Each Side of the Harness Frames.

Photo loaned by courtesy J. E. Sirrine & Co.

No Confusing Shadows are in Evidence in This Room, Lighted by Standardized Lighting.

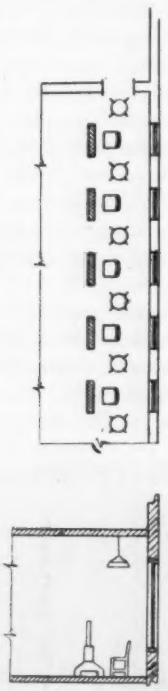

Fig. 4. A Convenient Arrangement for Lighting the Drawing-In Racks. One Unit Between Each Pair of Racks and Behind the Chairs of the Operators.

plemented by a lighting unit over each inspection table which will furnish 8 to 15 foot-candles of well diffused, glare-protected illumination on the cloth. Dark cloth will require the higher level, and gray goods the lower. Keen, quick vision is required of the inspectors because the cloth is continually moving over the benches and it is reasonable that in order to catch and remedy the flaws with little delay, the best quality of illumination should be supplied. Since the machines are not located in a uniform arrangement with respect to each other, no standard group lighting arrangements can be shown. Any of the spacing arrangements shown under weaving, will fill the requirements of the cloth room.

Drawing-in.—The drawing-in process requires steady close application to eliminate mistakes in drawing the warp ends through their proper harness wires. The seated operators should at all times be placed with their backs to the windows, and should not be required to face any extra bright walls, windows, or lighting units. A good plan is to locate the units behind and above the head of each operator as indicated in Fig. 4. A good vertical illumination of 6 to 10 foot-candles is needed such as would be furnished by 100- to 150-watt bowl-enameled lamps and RLM domes in the positions shown.

Machine shop.—Practically every mill has a machine shop and repair department connected with it. The same lighting units used in the mill proper could well be used in the machine shop. Bare local lamps on dangling drop cords, miscellaneous tin shades and reflectors of unknown origin should be replaced by a good general illumination system similar to that advocated for weaving. For machine shop work consisting of lathe, drill press, and other power machines in addition to bench work, an illumination level of 6 to 12 foot-candles is found to be the best practice.

Special Operations.

Lappers and combing machines.—Where it is desired to spin special kinds or very fine yarns from long staple cotton, sliver lappers and combing machines are found. Because of the small number of machines and lack of uniform arrangement, no group lighting recommendations are made. The common practice is to light such machines by general systems spaced without particular regard to the machine

(*Continued on page* 400.)

Indigo

BY WILLIAM B. NANSON.

Production and Chemistry of Indigo.

Indigo is a most valuable dyestuff, and is one of the oldest and fastest coloring matters known to man. The ancient Egyptians used it to dye their mummy cloths with, and the peoples of India and China have been familiar with its dyeing qualities through the mists of countless years. Ancient Rome also was acquainted with it but used it as a pigment only, not knowing how to reduce it and render it soluble for dyeing; but it is only since the sixteenth century, however, that it has been generally known in Europe as a dyeing agent, when it was introduced from India, where it had long been in use.

Indigo is an herbaceous plant, with a single stock (Fig. 1), growing to a height of three feet or three feet six inches, and about the thickness of a finger. The plants which furnish indigo do not all belong to the same family, but the most important are leguminous and of the genus

Fig. 1. The Indigo Plant.

Indigofera. The most valued and most largely cultivated species are the *Indigofera tinctoria, Indigofera disperma, Indigofera anil,* and *Indigofera argenta.* These plants appear to be indigenous to the provinces of Cambay or Guzerat, but are also cultivated in India, China, Java and the East. It was also introduced into the West Indies and South America by the Spaniards. The *Indigofera argenta* is chiefly cultivated in Egypt and Arabia. The *Indigofera tinctoria,* which is the plant shown in Fig. 1, is the species most abundantly grown, and is raised from seed which is sown in the spring or the fall, according to the variety, the nature of the soil, and the facility of the water supply. It is generally cut for the first time in June or July, just before the plant is in full bloom; a second and a third cutting being obtained during the year. When cut it is made into bundles and taken to the factory. The value of the crop is almost in proportion to the abundance of leaves the plant bears, as the coloring matter exists chiefly in that part of the plant.

The factory is usually furnished with two rows of steeping vats, the bottom of the upper row being level with the top of the lower. Each series numbers from fifteen to twenty and each vat is about twenty feet square and three feet deep, they are built of brick and lined with cement.

About 100 bundles of the cut indigo plants are placed in each upper vat, in rows, and pressed down with heavy pieces of wood; this is necessary to the success of the operation. Water is then run into the vats so as to completely submerge the plants, when a fermentation quickly ensues which lasts from nine to fourteen hours according to the temperature of the atmosphere. From time to time a small quantity of the liquor is taken from the bottom of the vat to see how the operation is proceeding. If the liquor has a pale yellow hue the product obtained from it will be far richer in quality but not so abundant in quantity as if it had a golden yellow appearance.

The liquor is then run off into the lower vats, into which men enter and agitate it by means of paddles or oars or else, which is better, by mechanical means, using a revolving paddle wheel. The idea of this is to thoroughly aeriate or oxidize the liquor for about three or four hours. During the operation the yellow liquor assumes a greenish hue, and the indigo separates in flakes. The liquor is then allowed to stand for an hour, and the blue pulpy indigo is run into a separate vessel, after which it is pumped up into a pan and boiled, in order to prevent a second fermentation, which would spoil the product by giving rise to a brown matter. The whole is then left standing for twenty hours, when it is again boiled for three or four hours, after which it is run on to large filters which are placed over vats of stonework about 21 feet long, 6 feet wide and 3 feet deep. The filters are made by placing bamboo canes across the vats, covering these with bass moss and stretching strong canvas over all. The greater part of the indigo remains under the form of a dark blue, or nearly black paste, which is now introduced into small wooden frames having holes in the bottom and lined with strong canvas. A piece of canvas is then placed upon the top of the frame, a perforated wooden cover, which fits into the box, is put over it, and the whole submitted to a gradual pressure. When as much of the water as possible has been squeezed out the covers are removed, and the indigo allowed to dry slowly in large drying sheds from which the light is carefully excluded. When dry it is ready for the market.

Each vat yields from 36 to 50 pounds of indigo. The best qualities of indigo are usually manufactured by Europeans, who are more careful about the various operations than the native help. Some makers, in order to force the precipitation, add a little lime water to the indigo after oxidation in the vat by agitation, this saves time and some makers add ammonia during the fermentation process which, they claim, makes for a purer product.

Indigo which is extracted from the various species of Indigofera varies very much, not only in the percentage of pure indigo which it contains, but also in its dyeing power. This variation is still further increased by differences of climate and by the mode and amount of care taken in its preparation. There are, therefore, many qualities known in the market, of which the best are those of Java, Bengal and Guatemala.

Java indigo contains, as a rule, the highest percentage of indigotin, but the general opinion among woolen dyers seems to be that it does not give as good results as a high class Bengal product of corresponding quality. Good Bengal indigo may be said to contain from 60 to 65 per cent. Madras indigo, on the whole, is of inferior quality, it contains about 30 per cent, but the variations are much greater than in the case of Bengal. The indigo of the Northwestern

Provinces of India is of a quality between that of Bengal and Madras.

Half a century ago we had no definite information as to the state in which the color giving principle existed in the Indigofera plants, nor of the changes which it undergoes during the process of manufacture and extraction. It had been stated by Chevreul, many years before, that the white indigo was held in solution in the plants by the vegetable fluids, and that on coming into contact with the oxygen of the atmosphere it absorbed oxygen, and was converted into the insoluble or blue indigo. In the year 1855, however, and subsequently in 1857 and 1865, Schunk published some most interesting papers, in which he described that true nature of the chemical changes which take place in the manufacture of indigo, and proved that indigotin (the coloring matter of indigo), like the coloring principles of madder (alizarin) and the dyewoods, existed in the plant as a glucoside to which he gave the name of indican. Schunk expresses the formula of indican and the decomposition it undergoes as follows:

$$C_{26}H_{31}NO_{17} + 2H_2O = C_8H_5NO + 3C_6H_{10}O_5$$
Indican + Water = Indigotin + Indiglucin

Indican is a transparent light brown sirup, from which it is impossible to separate the water which it still retains without decomposing it. Its aqueous solution has a yellow color, a bitter taste, and a slightly acid reaction. When boiled with caustic alkali it evolves ammonia. The alkaline earths and weak alkaline solutions produce a bright yellow color with the aqueous solution. Its alcoholic solution gives a bright yellow precipitate with acetate of lead, which is increased by the addition of ammonia; the aqueous solution does not give this reaction.

The most important and characteristic property of indican is that when treated with acids it readily splits up into indigotin, indirubin and indiglucin. If an oxalic or tartaric acid is added to an aqueous solution of indican and the mixture is allowed to stand, it yields a dark blue or purple precipitate, which is a mixture of indigotin and indirubin. The same decomposition takes place rapidly when an aqueous solution of indican is boiled with a small quantity of sulphuric, hydrochloric, or nitric acid; the liquid first becomes of a sky blue color, then opalescent, and lastly purple, leaving as the liquid cools a purple deposit of indigotin and indirubin. Both these bodies may be obtained in the crystalline state by sublimation.

Indirubin.

Indirubin, the substance obtained from indican along with indigotin, is probably identical with the indigo red of Berzelius, and is formed especially when the decomposition is effected by oxalic or tartaric acid. It may be separated from the indigotin by washing with alcohol the flocculent blue precipitate produced by the decomposition; this dissolves the indirubin and leaves the indigotin. On concentrating the alcoholic solution, the indirubin crystallizes out in long red needles which are soluble in alkaline solutions, and which are easily reduced when heated with caustic soda and some deoxidizing substance, such as protochloride of tin or grape sugar. On exposing this latter solution to the air it yields purple flakes, which, on being collected, washed and dried and heated between two watch glasses, give a sublimate of beautiful purple needles.

Indirubin originates from the indican existing in the leaves of the various species of Indigofera, and is due to no second constituent of the plant. This is now certain and its production is to be explained in all cases as due to the condensation of isatin with indoxyl. It has been shown that indigo containing indirubin can be readily reduced from indican by a repetition of the factory method, and again isatin itself has been isolated from natural indigo rich in indirubin. The formation of the isatin is favored by special circumstances such as the oxidation of the indoxyl by air in the presence of an alkali or an acid and may also be affected to some extent by the temperature. That indoxyl can be converted into isatin without an intermediate formation of indigotin has been surely proved, and it has been found that indoxylic acid, on standing in the presence of moist air, is converted chiefly into indirubin, although some quantity of indigotin together with a substance, probably indigo brown, and traces of isatin are simultaneously produced. The results of analyses of Java indigo which is the richest in indirubin, show that out of about 75 parts of the available coloring matter in Java indigo, 67 are indigotin and 8 indirubin.

Though indirubin was at one time considered to be a valuable constituent of natural indigo, it is now known that such is not the case. It has been found that the shade of color given by an indirubin vat became bluer from day to day, and that this was due to the formation of indoxyl by the further reduction of the leuco-indirubin.

In vat dyeing, therefore, indirubin may produce not more than half its weight of indigotin, and further it requires for reduction a much stronger reagent than indigotin, and as a result the greater part of this dyestuff is not attacked, but settles to the bottom of the vat.

On the other hand, indirubin disulphonic acid is a useful dyestuff and gives colors much faster to light than sodium indigotin disulphonate, i. e., the "indigo extract" of commerce.

Indiglucin.

Indiglucin is prepared by adding to the acid liquor from which the foregoing compounds have been separated an excess of acetate of lead. The sulphate of lead thus produced is removed by filtration, and to the filtrate an excess of ammonia is added, when the indiglucin is precipitated in combination with oxide of lead as a bulky yellow precipitate. This is washed and decomposed by sulphuretted hydrogen. The sulphide of lead is separated, and if the indiglucin solution is not perfectly colorless the last treatment may be repeated, or the solution may be shaken up with animal charcoal. The colorless liquid thus obtained is concentrated to the state of a syrup, this syrup is then dissolved in alcohol, and on the addition of twice its volume of ether, the indiglucin is separated as a pale yellow syrup, having a sweetish taste. Mixed with concentrated sulphuric acid it yields a dark red liquid which blackens when heated. It is converted into oxalic acid by boiling nitric acid. With cupric sulphate and caustic soda it gives a deposit of suboxide of copper.

When an aqueous solution of indiglucin is mixed with yeast and allowed to stand in a warm place, no gas is given off, nor is there any sign of fermentation, but after a few days the liquor is found to be strongly acid owing to the formation of acetic acid. The two characteristics last described show that indiglucin is not identical with glucose, but is a peculiar saccharine matter, probably dextrose. The action of alkalis on indican or of alcohol alone, or of

alcohol and a reducing agent have of course a scientific interest, but are of no commercial value and have no place in this present article. Therefore, I shall proceed to describe somewhat fully the more important color giving principle of indigotin, already mentioned as one of the products of the decomposition of indican when submitted to the action of acids.

Indigotin.

Indigotin ($C_{16}H_{10}N_2O_2$) is a derivative of indol. It can be prepared in an almost pure state by extracting good qualities of Bengal or Java indigo (or synthetic indigo) with boiling nitrobenzene from which it crystallizes on cooling in dark blue crystals having a metallic sheen. When heated in an open vessel it readily volatilizes, yielding a violet vapor which condenses on cooling in the form of crystals. Indigotin is also soluble in boiling aniline oil, quinoline, glacial acetic acid and chloroform, but is insoluble in water, dilute acids and alkalis and ordinary solvents such as alcohol, ether, etc. By nitric acid and many other oxidizing agents it is readily converted into isatin $C_8H_5NO_2$. Heated with concentrated sulphuric acid it yields a disulphonic acid, $C_{16}H_8N_2O_2(SO_3H)_2$, the sodium salt of which finds application as an acid color in wool dyeing under the name of Indigo carmine.

By the action of reducing agents, indigotin is converted into indigo white $C_{16}H_{12}N_2O_2$ which is readily soluble in alkalis or milk of lime with a yellow color. On exposing the alkaline solution to the air the indigo white is rapidly oxidized back into indigotin, and on these two reactions the application of indigo in dyeing and printing is based.

If finely powdered indigo be boiled with aniline it readily dissolves forming a blue solution, which, if filtered hot, and set aside to cool for some time, deposits almost the whole of the indigo in the crystalline state. After being washed with alcohol and dried it is chemically pure, having a brilliant coppery luster and rivalling in appearance that prepared by sublimation. Boiling paraffin may also be employed for this purpose, the solution having a fine red color of indigo vapor; in fact, a dilute solution can hardly be distinguished from an alcoholic solution of magenta. When cold, the indigo crystals, which closely resemble those of sublimed indigotin, may be purified by washing them with benzene. Indigo can also be crystallized from Venice turpentine, and from high boiling point petroleum. Anhydrous acetic acid, to which a drop or two of sulphuric acid has been added, dissolves a sufficient quantity of indigotin to give fast colors when printed on fabrics. If water is added to the solution the indigotin is precipitated unaltered.

Indigotin, under the action of oxidizing agents, such as nitric acid, yields three distinct products—isatin, indigotic or nitrosalicylic acid and picric acid.

Isatin $C_8H_5NO_2$ may be prepared as follows: One pound of indigo is mixed with water so as to make a thin paste, which is then heated, and nitric acid of specific gravity 1.35 gradually added until the blue color of the indigo has disappeared: this usually requires from eight to twelve ounces. The product is then diluted with a large quantity of water, boiled and filtered. On cooling, the impure isatin separates from the filtrate as a brown deposit. To remove a dark colored semi-fluid resinous body which adheres to the isatin, it is dissolved in a solution of caustic soda and carefully neutralized with hydrochloric acid. By this means the resin is first precipitated, and on filtering off and adding an excess of acid to the filtrate, the isatin separates in a nearly pure state. After being washed and re-crystallized once or twice from hot water it is quite pure. It forms reddish brown prismatic crystals, belonging to the trimetric system, which are inodorous, and readily soluble in alcohol, but less so in ether. Its formation from indigotin may be thus represented:

$$\underset{\text{Indigotin}}{C_{16}H_{10}N_2O_2} + O_2 = \underset{\text{Isatin}}{2C_8H_5NO_2}$$

Indigotic acid or nitrosalicylic acid is prepared from indigo as follows: 2 pounds of nitric acid, of specific gravity 1.28 is introduced into a tabulated retort, to which one pound of coarsely powdered indigo of good quality is gradually added. Great care is required in conducting the experiment, as the action is very violent; the product which floats upon the surface of the liquid, consisting of a small quantity of indigotic acid, mixed with a large quantity of a resinous substance, is treated with water to dissolve the acid, and this solution is returned to the acid liquor in the retort. On concentrating the liquid by distillation and allowing it to cool, indigotic and picric acids crystallize out.

Nitrosalicylic or indigotic acid is only sparingly soluble in cold water but freely so in boiling water and in alcohol. With persalts of iron it gives a red coloration, and with salts of lead a voluminous precipitate of a pale yellow color.

When indigo is acted upon by strong nitric acid, the product is *picric acid*: one part of indigo, broken into small pieces, is very gradually and cautiously added to ten or twelve parts of boiling nitric acid of specific gravity 1.43. The action is very violent, and if too much indigo be added at once, an explosion ensues. When the whole of the indigo has been introduced, more nitric acid is added, and the liquid boiled until no more red fumes are given off. On cooling, semi-transparent yellow crystals separate which are collected, washed with cold water, and then re-crystallized. The picric acid of commerce is now, however, prepared on a large scale from phenol, and is extensively used as an explosive and in the dyeing of silk and wool. It crystallizes in long, pale yellow brilliant rectangular plates, which are very soluble in alcohol, ether and benzene and require about 85 parts of cold water for solution.

The various actions of chlorine on indigotin produce trichloraniline and trichlorophenol, chlorizatin, dichlorizatin, chloraniline, etc., but their discussion is not necessary here.

The action of alkalis on indigotin varies according to the temperature, and the circumstances under which the reaction takes place. If an oxidizing agent be added anthranilic acid is produced, while at higher temperatures salicylic acid is formed and ultimately aniline.

Anthranilic acid, phenylcarbamic acid, or meta-amidobenzoic acid, is a constant and well defined product of the decomposition of indigotin (or indigo) under the influence of alkalis. The process for the preparation of this acid is as follows: Indigo blue is kept boiling in caustic potash of specific gravity 1.35, water being added from time to time to replace that which evaporates. Previously to the disappearance of the last portions of the indigo, finely pulverized peroxide of manganese is added to the boiling liquid until a sample of it, when diluted with water

and allowed to stand, no longer deposits indigo blue. It is then diluted with boiling water, supersaturated with dilute sulphuric acid, and filtered. The filtrate, when neutralized with potash and evaporated to dryness, leaves a residue consisting of a mixture of potassium sulphate and anthranilate, with a brown coloring matter; on treatment with hot alcohol the two last are dissolved out, leaving the potassium sulphate. The alcohol is now distilled off and the residue dissolved in water, and a slight excess of acetic acid is added, when orange colored crystals of impure anthranilic acid are deposited. These may be readily purified by re-crystallization from boiling water with the aid of animal charcoal; on cooling, the hydrated anthranilic acid is deposited in transparent, colorless foliated crystals, with dihedral summits.

The formation of anthranilic acid from indigo by this process admits of a simple explanation. The action of potash on indigotin converts it into indigo white and potassium isatate; and the addition of manganic peroxide oxidizes the white indigo to indigotin again, thus rendering it capable of being converted into potassium isatate. The latter compound is converted into potassium anthranilate thusly:

$$C_8H_6KNO_3 + 2KHO = C_7H_6KNO_2 + K_2CO_3 + H_2$$

Potassiumisatate = Potassiumanthranilate

Anthranilic acid has also been synthetically prepared from benzoic acid by converting it first into bromonitrobenzoic acid then into bromo-amido-benzoic acid and finally by the action of sodium amalgam into meta-amido-benzoic or anthranilic acid.

Anthranilic acid or phenyl-carbonic acid, $C_7H_7NO_2$, crystallizes in colorless four or six sided prisms, having a bitter taste. It is only slightly soluble in water, but very soluble in alcohol and ether. Heated at a moderate temperature, it sublimes unchanged, forming white crystals similar to those of benzoic acid; but if mixed with glass and rapidly heated an oily fluid distills over, which is aniline. The glass, which is powdered , yields none of its chemical elements to the anthranilic acid, but acts as a catalyst to dissociate the acid into aniline, the glass itself undergoing no chemical change, thus:

$$C_7H_7NO_2 = C_6H_7N + CO_2$$

Anthanilic acid Aniline

Aniline is formed, as before stated, when indigo is mixed with hydrate of potash and distilled. By re-distillation pure aniline is obtained equal to about one-fifth the weight of the indigo taken. Aniline is now prepared commercially on a large scale by the reduction of nitro-benzol by means of iron filings and hydrochloric acid or ferrous chloride.

I have taken the pains thus far to enter into a rather elaborate detail of the various chemical changes which natural indigo may be made to undergo, in order to show to the reader that the production of picric, salicylic and anthranilic or phenyl-carbamic acids, and especially of aniline by the action of chemical agents upon indigo, and the apparent relation which these bodies bear to phenol and benzene is what produced in the minds of the chemists the conviction that indigotin might be prepared synthetically from some member of the benzene series, and has resulted in the successful production of the synthetic indigo, indigoid and other vat colors used in dyeing.

(This is the first of a series of articles on this subject by Mr. Nanson. Others will follow.—Editor.)

The Design and Manufacture of Fustians

BY T. WOODHOUSE AND A. BRAND.

Corduroys.

What is often described, more or less correctly, as the smallest corduroy weave proper, is that shown in Fig. 30, where A shows four repeats of the point-paper design of the weave known as "thickset" cord or corduroy. The unit is complete on 6 threads and 9 picks, and the fabric is usually woven by 6 harnesses with a straight draft. It could be woven, however, with 5 harnesses with the weaving plan B and the corresponding draft C, were such a method necessary or desirable. The filling is inserted in the following order: 2 picks of pile, and 1 pick of ground.

The ground weave is the 2 up 1 down warp flush twill to right; this will naturally appear as a left-hand twill when viewed from the back of the fabric. The warp flush weave is used, as previously explained, to facilitate somewhat the cutting process. The pile picks produce rows of alternate floats of 3 and 1 across the fabric from selvage to selvage.

The cutting knife is passed up the center of the various races, and, because of the short floats, produces a short stubby pile; also, in virtue of the shortness of the float—modified, naturally, by the sett of the warp—the number of races per inch is comparatively large. Hence, the characteristic features of this class of corduroy are two in number:

(1) The shortness of the pile tufts, and

(2) The comparatively large number of races per inch.

These features are mainly responsible for the name "thickset" which is generally applied to such fabrics. It will be obvious that the length of the pile in such fabric is about the shortest possible, since the flats which form the tufts

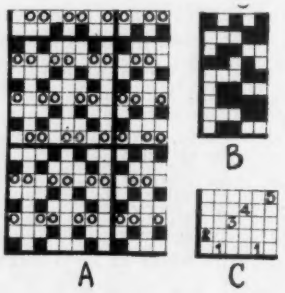

FIG. 30.

are over three threads only. The length of each side of any tuft will thus correspond to floats of 1½ threads. The pile filling interweaves with the ground fabric, however, in such a manner as to produce a lashed tuft or fast-pile similar to that exemplified at B, Fig. 1, and also in Fig. 14. The pile tuft is thus equal-sided, and all the tufts are of the same length, so that the characteristic rounded rib

is not produced by this weave; hence, the resulting fabric can hardly be regarded as a corduroy proper.

Photographic reproductions of two samples of corduroy, or Genoa cord as they are sometimes called, in the loom or uncut condition appear at A and C in Fig. 31. It will be shown presently that these two fabrics have practically the same structure, the main difference being one of weight or quality only. Both of them are really heavy compact textures; no warp is visible on the upper surface of the fabric, and, particularly in the case of the upper sample A, it would almost appear impossible to insert more filling.

As some slight evidence of the stiffness of these two samples, it may be mentioned that in mounting them for reproduction by photography, it was found impossible to fold over a small piece in order to exhibit the back of the fabric—as is done in Figs. 9, 11, etc.,—even with the aid of a good adhesive and heavy pressure. It was found more convenient to cut off and mount the separate pieces marked B and D; these exhibit the appearance of the backs of samples A and C respectively. It will be observed that the direction of the twill in the back view B is upwards towards the right, i. e., a right-hand twill; whereas in the back view C, the direction is exactly opposite, i. e., a left-hand twill. These are, of course, the directions viewed from the backs of the fabrics; the actual twills, as woven, are, naturally, of the opposite hands.

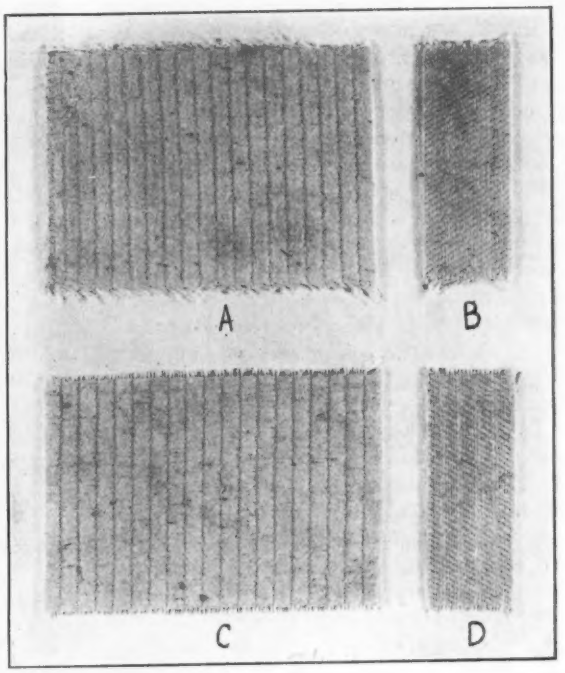

FIG. 31.

The point-paper design at A, Fig. 32, shows four repeats of the weave used in the production of sample C, Fig. 31—two repeats in each direction. The unit weave is complete on 12 threads and 12 picks, and the latter are inserted in the following order: 2 picks of pile filling and 1 pick of ground filling.

The weave of the foundation structure is the 2 up 2 down twill, variously known as the common, serge, sheeting, blanket, cassimere, shalloon, casmere, Batavia, Harvard, etc.; one repeat or unit is shown separately at C, Fig 31. The direction of the twill is towards the right; as already explained, and as exemplified at D, Fig. 31, the direction of the twill when viewed from the back, is towards the left.

The fabric illustrated at A, Fig. 31, is identical in structure with that of C, except that the foundation twill is in the opposite direction. For reproduction in the loom, weave A, Fig. 32, requires 8 harnesses and a tappet or

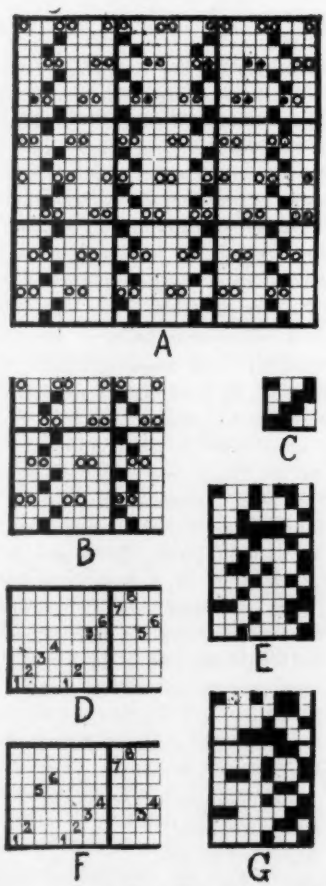

FIG. 32.

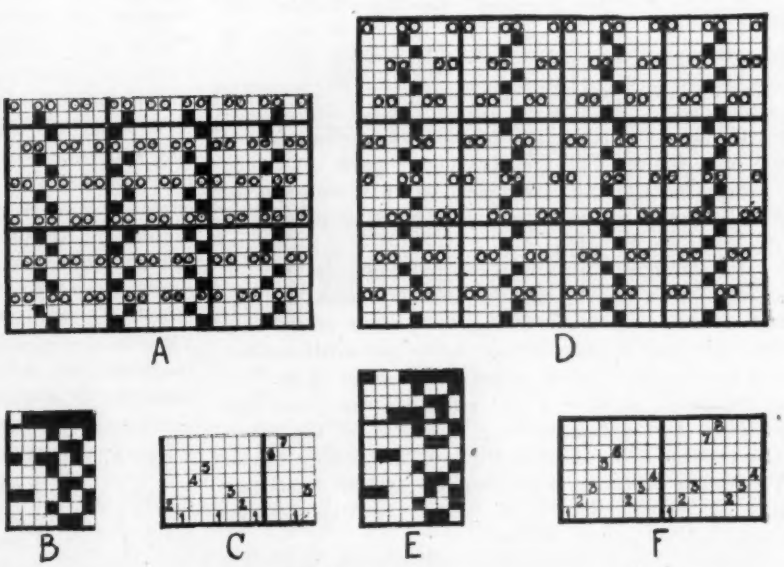

FIG. 33.

wyper driven at a speed of one revolution for 12 picks. Alternative weaving plans and drafts are given at E and G, and D and F respectively. Weaving or tappet plan E would be used along with the draft indicated at D; the order of the draft in this case is comparatively simple, but it has the disadvantage of having two of the more crowded harnesses nearer the back of the loom than they need be. The weaving plan G, obtained by re-arranging the plan E, obviates this fault, as will be seen from the corresponding draft F; in this draft each of the front four harnesses carries one-sixth of the total warp threads, whereas each of the back four harnesses carries only one-twelfth. The pile picks form alternate floats of 6 and 4; these, after having been cut, will form pile tufts the unequal sides of which will be in the proportion of 3 to 2.

Sample A, Fig. 31, weighs about 17¼ oz. per square yard; it is woven with 36 threads per inch of 3-fold 32s (3/32s) cotton warp, and 276 picks per inch of 14s single soft-twisted cotton filling. Sample C, in the same figure, is considerably lighter in texture; it weighs about 10½ oz. per square yard, and contains 48 threads per inch of 2/36s cotton warp, and 288 picks per inch of single 22s soft-twisted cotton filling.

The point-paper designs for two other common corduroy weaves are given in Fig. 33. In this illustration, the design A shows four repeats—two each way—of a twill back corduroy complete on 12 threads and 9 picks. The picks are in the following order: 2 picks of pile filling and 1 pick of ground filling; the ground weave is the 2 up 1 down twill to right, sometimes known as the prunelle twill.

The pile picks form alternate floats over 6 and 4 threads, producing thereby an unequal-sided or J-tuft; the relative lengths of the two limbs are 3 and 2 respectively. One weaving plan is shown at B; it indicates that 7 harnesses will be required, and that the tappet must be driven at a speed of one revolution for nine picks. The corresponding draft is given at C, and the two are arranged so that the more crowded harnesses are nearest the weaver or the front of the loom.

The point-paper design D, Fig. 33, exhibits four repeats of a weave which is practically the same as that fully illustrated in Fig. 32. The chief difference is in the lengths of the floats of the pile filling which extend respectively over 8 and 6 threads, as against 6 and 4 threads in the design in Fig. 32. If the two weaves were utilized for the same sett, the lengths of the tufts, or the height of the pile, would be proportional to the floats. The unit weave at D, Fig. 33, is complete on 16 threads and 12 picks, and one suitable weaving plan is supplied at E with the necessary draft at F.

Several varieties of ordinary fustian, such, for example, as imperial sateens or lambskins, are subjected to a perching or raising operation during the process of finishing. The weft used is comparatively heavy and softly twisted, and the raising operation, which is performed on the back of the fabric, produces a soft wooly-like nap which adds somewhat to the heat-retaining properties of the fabric, and imparts to it an extremely soft and kindly handle. This raising operation is not used very extensively amongst corduroy fabrics, nevertheless, certain varieties are regularly finished in this manner.

Figure 34 is a photographic reproduction of a comparatively light make of corduroy which has been finished in the above-mentioned particular way. The face side of the fabric proper is shown at A in the cut condition, while the selvage is exhibited at B. A small portion, marked C, has been folded over in order to show the feature of the back. The nap in this case is short, but it undoubtedly adds to the kindly handle of the fabric, fills up the interstices, and renders it more heat-retaining than it would be unraised. The ground weave is a 3-thread twill, but the usual twilled appearance is almost totally obscured as a result of the raising process.

When such an operation of raising is necessary or desirable, it is practically essential to use a special form of corduroy weave; this special form is really a standard corduroy design backed with filling, that is to say, certain

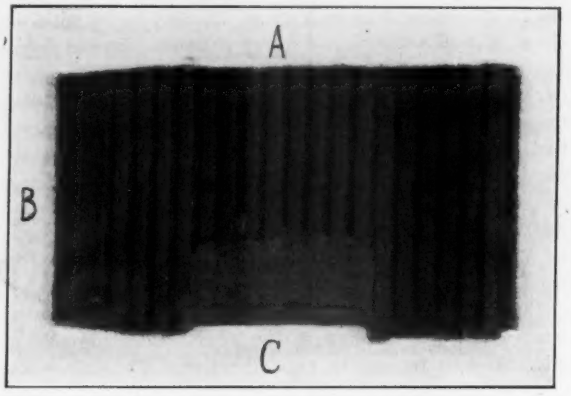

FIG. 34.

picks of filling in each repeat of the weave are made to appear at the back of the fabric, and are only comparatively loosely bound into the ground structure.

A typical example of a weft-backed corduroy weave is that given in Fig. 35, where four repeats of the weave appear in the point-paper design A, two repeats in each direction. The unit weave is thus complete on 12 threads and 11 picks, and the cloth is capable of being woven by 8 harnesses. A suitable draft and the necessary weaving plan appear at B and C respectively. The various kinds of picks are distinctively marked as under:

Pile picks are represented by solid black squares.
Backing picks are represented by solid black circles.
Ground picks are represented by circles.

It should be borne in mind that the different marks only indicate the *purpose* of the filling, and that the same kind and count of filling is used throughout the fabric, irrespective of the particular purpose it plays on any line of filling. Except for the backing picks, the weave is identical with that shown at A, Fig. 33; indeed, Fig. 35 may be regarded as having been developed from Fig. 33 by introducing two backing picks in each repeat or unit weave. These backing picks form floats of 5 threads on the *back* of the fabric; that is to say, they are stitched into the ground structure on every sixth thread.

The order of inserting the filling for a cloth woven with design A, Fig. 35, is as under:

2 picks of filling for pile.
1 pick of filling for back.
1 pick of filling for ground.
2 picks of filling for pile.

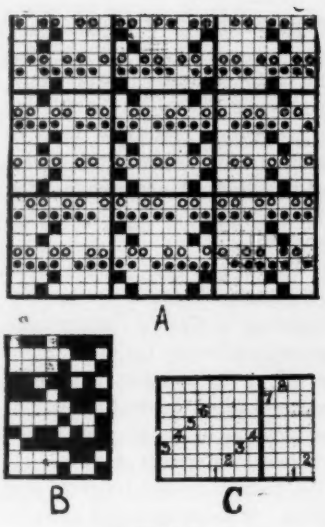

Fig. 35.

1 pick of filling for back.
1 pick of filling for ground.
2 picks of filling for pile.
1 pick of filling for ground.

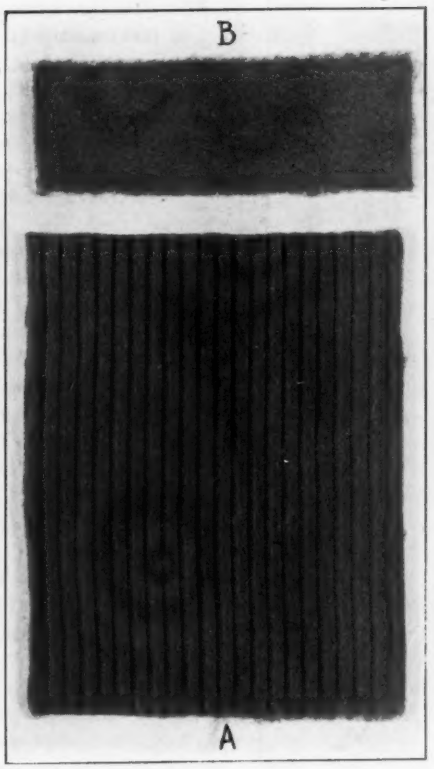

Fig. 36.

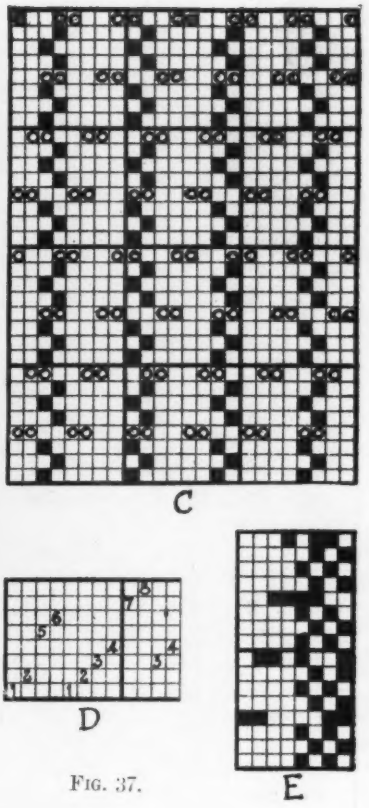

Fig. 37.

The backing picks add substantially to the bulk and compactness of the fabric, and withstand practically the whole of the raising operation. These fabrics may be woven in any suitable sett; that illustrated in Fig. 34 has 38 threads per inch of 2-fold cotton warp yarn, and about 180 picks per inch of single soft-twisted cotton filling.

Figures 36 and 37 provide full details of another variety of twill back cord in which the finishing process includes an operation of raising on the back. The fabric differs from that illustrated in Fig. 34 in that the structure is not specially arranged for raising, that is to say, there are no special floating picks on the back. Consequently, the actual amount of raising done is comparatively small.

A view of the face side of the cloth is shown at A, Fig. 36, while a view of the slightly raised underside of the cloth appears at B in the same figure. This particular example is of excellent quality and rich in appearance; it is admirably adapted for use in high-class upholstery work and for similar purposes. The fabric, which is fairly heavy, about 17¼ oz. per square yard, is woven with 48 threads per inch of a strong 3-fold cotton warp, and with 448 picks per inch of a heavy soft-twisted cotton filling. There are about 9½ longitudinal cords per inch of width.

Four repeats of the weave appear at C, Fig. 37; the unit is thus on 12 threads and 16 picks, and the design can be drafted on 8 harnesses. One suitable draft on this number of harness is shown at D with the corresponding weaving plan at E. The basic structure is the 2 up 2 down twill to right, shown in circles, while the pile picks, inserted in the proportion and order of three pile to one ground, float over five threads.

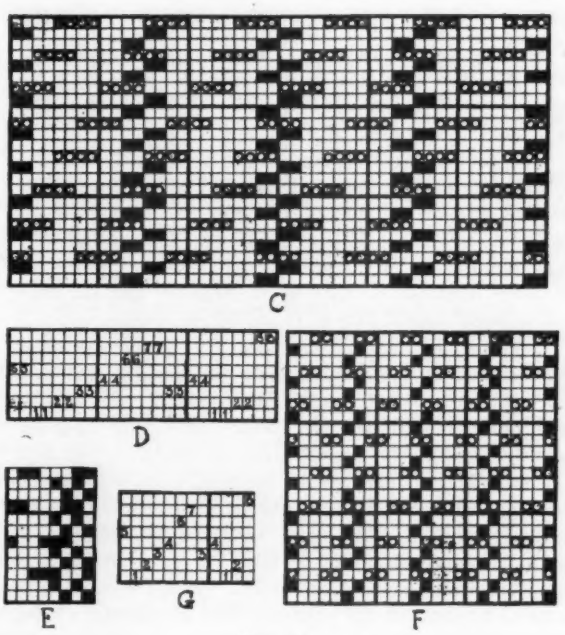

Fig. 39.

The corduroy illustrated in Fig. 38 differs in several important respects from those previously described. In this illustration, the face of the cloth is photographically reproduced at A in the loom or uncut condition, and the sunk vertical lines mark the positions of the stitching points of the pile filling. A small sample, illustrating the

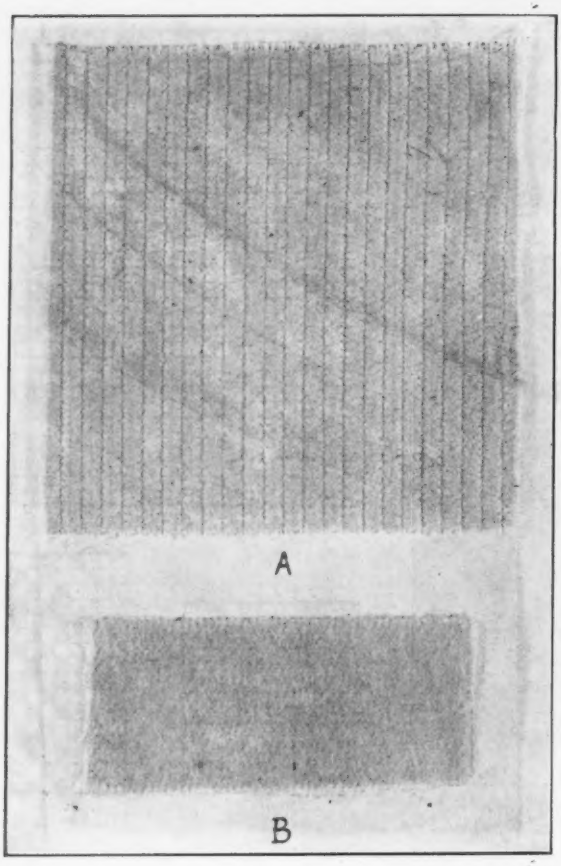

Fig. 38.

back of the fabric is shown at B in the same figure. No weave structure is visible, as it is entirely hidden by a fine soft nap which has been obtained by a process of raising prior to the operation of fustian cutting.

The actual weave structure of the complete fabric is indicated by the point-paper design C, Fig. 39, which shows four repeats of the unit weave, two in the way of the warp, and two in the way of the filling. The unit weave is thus complete on 24 threads and 12 picks, and is capable of being produced in cloth by 8 harnesses and the draft and weaving plan shown at D and E respectively.

A further examination of design C, Fig. 39, will reveal the fact that all the warp threads are in pairs, that is to say, the 1st and 2nd threads interweave in precisely the same order; the 3rd and 4th threads weave alike, but differently from the 1st and 2nd, and so on over a full unit. The sample may therefore be regarded as a double-warp corduroy. To render the explanation quite clear, an exactly similar, but single-warp, structure is shown at F; this point-paper plan may be taken to represent the cloth in all essential particulars if each vertical row of little squares is assumed to represent the movements of two single warp threads or one double warp thread. For the actual operation of weaving, two separate warp threads would be drawn through each individual mail of the harness, and the draft G would be employed along with the weaving plan E which, as already stated, is also the weaving plan for design C when the threads are drawn singly through the mails of the harness as indicated in the draft D.

The fabric reproduced in Fig. 38 is of a fairly heavy quality, as one square yard weighs approximately 13½ oz. in the condition shown, viz., woven and raised only. There are 96 single or 48 double warp threads per inch, and 240 picks per inch of filling. The warp is 45s single cotton, while the filling is 16s single cotton, softly twisted.

(To be continued.)

What the Southern Mills are Doing.

The semi-annual meeting of the Southern Textile Association will be held at Wrightsville Beach, N. C., on June 2 and 3. Members of the Association recall this resort as the place of meeting for some previous conventions, and a good attendance is expected this year. A program is being prepared and details will be announced later. The sessions will be held in the Oceanic Hotel.

Following a meeting on March 9 of the Gaston County Spinners' Association at Gastonia, N. C., a drastic systematic curtailment of production in Gaston County mills was announced. More than half of Gaston County's 1,140,000 spindles were represented at this meeting. The purpose of this action, as announced after the meeting, was to reduce the amount of stock yarns in warehouses at the present time. As this curtailment agreement went into effect, yarn production in the district around Gastonia and Charlotte took a decided drop. Some mills closed down to await the receipt of new orders, with others operating on reduced time; while others were in a position to continue on full time for some weeks.

Other centers in the North Carolina fine yarn section reported decisions to curtail and from other parts of the southern section news of reduced operation were heard. On the other hand, some mills are maintaining a full-time schedule right along, with sufficient orders, and some plants —the mill of the Western Reserve Cotton Mills Georgia Company at Quitman, Ga., for an instance—report a 24-hour a day schedule.

It seems therefore that the condition of the mills is practically one of the individual plant; no general plan or description applying to any notable section of the industry. All factors, however, are looking forward to a better condition in the distance, although some, to meet immediate necessities, are reducing production.

The City Cotton Mills Co., Newton, N. C., whose plant has not yet been placed in operation, are considering the installation of looms in addition to the originally planned equipment of 5,000 spindles, and it is the present plan of the company to get the plant in operation in about two months. G. A. Warlick is president, W. B. Gaither is treasurer and W. E. Bacon, superintendent.

Pine Hall Manufacturing Company is the name of a company organized at Pine Hall, N. C., for the purpose of constructing a cotton mill, as noted. J. P. Ayres is president, and the capital is $250,000.

The Baldwin Cotton Mills, Chester, S. C., has decided to install 100 new Draper looms.

Lydia Cotton Mills, Clinton, S. C., will install 118 40-inch automatic looms to replace old weaving machinery.

Knoxville Spinning Company, Knoxville, Tenn., has increased its capital from $300,000 to $450,000 to provide for the payment of the installation of additional equipment recently added.

The Midway Cotton Mills, at Rockingham, N. C., are building a one-story, 50x100 foot, cloth room.

The Holly Manufacturing Company will succeed the Fidelity Manufacturing Company of Charlotte, N. C. The new concern has been chartered by the secretary of state with an authorized capital of $400,000. The principal incorporators are W. B. Robertson, Frank D. Alexander, W. H. Belk and A. P. Rhyne. These incorporators constitute the owners of the larger part of the stock of the former Fidelity Manufacturing Company which was voluntarily placed in the hands of a receiver some weeks ago in order to perfect a reorganization of the company. Captain William Anderson was named the receiver and the plant and property was put up for sale at public outcry, but brought such a low price that the referee did not report the sale to the court.

Captain Anderson later sold the property at private sale to the men named, and the organization of the Holly Manufacturing Company was determined upon.

The Charlotte Dye Works, Charlotte, N. C., has been chartered, the principal stockholders being George H. Brockenbrough, Jr., George H. Brockenbrough, Sr., and G. L. Brockenbrough. The plant will be maintained and operated in connection with the Belbro Mills, which is owned by the incorporators of the new firm.

The annual meeting of the Southern Consolidated Yarn Spinners Association, representing about 2,500,000 spindles in this section, was held at the Selwyn Hotel, Charlotte, N. C., on March 8. There were about 125 spinners present. The election of officers resulted in the re-election of those who have served for the past year, as follows: Robert Chapman, president; W. P. Moore, York, S. C., vice-president; and Carl R. Hart, York, S. C., secretary-treasurer. There was very little business conducted at the meeting. The members spent an hour listening to an inspirational address by Dr. Charles Aubrey Eaton of Philadelphia, president of the American Educational Institute, on "America's Greatest Need."

The Acworth Cotton Manufacturing Company's plant and property at Acworth, Ga., has been purchased by an eastern syndicate through an agent, Miss Helen K. Sill, of Rockville, Conn. It is announced that the new owners will enlarge the plant and install additional and more modern equipment.

The property of the Fulton Cotton Mill, Athens, Ala., was to be sold on March 20 by R. H. Walker, receiver for the concern which recently went into bankruptcy.

The overseers of the Erwin Cotton Mills, Duke, N. C., gave a banquet recently in honor of Manager W. A. Erwin, Jr. A four-course dinner was served. At the close of the banquet, Superintendent E. H. Bost presented Manager Erwin with a beautiful English setter bird dog, this being given him by the overseers as a token of their respect.

A cotton mill is planned by Charles B. Peters, president of the Peters Oil Company, Tulsa, Oklahoma, to be located somewhere between Tulsa and Oklahoma City. Of the $300,000 required to build and finance the mill, half has already been subscribed. Ginghams may be the product of the proposed mill.

At a meeting of the stockholders of the Alma Mills, recently reorganized from the Cash Mills, Gaffney, S. C., the capital stock was authorized at $400,000, and the following were elected directors: W. C. Hamrick, Waite C. Hamrick, H. J. Fullerton and C. S. Child. W. M. Hamrick will be president and treasurer and Waite C. Hamrick will be secretary and assistant treasurer.

The Elmore Company, Spindale, N. C., has erected a high powered Westinghouse wireless telephone in the office. The outfit has a 150-foot aerial, which is suspended from a 21-foot pole on top of the office building and from there to the top of a standpipe which is about 125 feet high. Cotton and other market reports will be received daily.

The Durham (N. C.) Cotton Manufacturing Company will displace several hundred old looms with 130 new automatic looms.

Residents of Mocksville, N. C., in a recent public meetting, subscribed for part of the stock of a company that plans to build a cotton mill there.

R. L. Poindexter, E. L. Byrd, C. G. Armstrong and J. R. Poindexter, of Elkins, N. C., plan the organization of a company for the erection of a cotton mill at that place.

The Royal Mills, Charleston, S. C., is to build an addition to its plant to cost $50,000.

The Kincaid Manufacturing Company, Griffin, Ga., have amended their charter to increase the capital stock from $1,500,000 to $2,500,000. It is planned to build a large bleachery near Griffin, to do work on goods manufactured in the mill at Griffin. Machinery is already on the grounds and men are drilling wells to provide the necessary water supply.

The Globe Mills, Augusta, Ga., are replacing 128 old looms with a like number of Stafford automatic looms.

Election of officers was recently made by the Arkansas Cotton Mills Company, Pocahontas, Ark., organized about a year ago with $3,000,000 capitalization. The president elected is E. Dalton, and the secretary-treasurer is T. W. Campbell. The company plans to build a chain of cotton mills throughout the state of Arkansas. Although there has been no effort to sell stock during the past year, on account of general business conditions, it is stated that many applications for stock have been received. An active campaign will begin at once to sell sufficient stock to finance the erection of the first plant, which will probably be built at Brinkley, Ark.

Work of installing machinery is well under way at the new mill of the Kingsville Cotton Mills Company, Kingsville, Texas, and operations will begin shortly. The mill will open with 5,000 spindles and manufacture twine exclusively at first, but plans are made for additional machinery that will increase the number of spindles and give the mill a varied product. W. D. McNeill and D. H. Jones, experienced cotton manufacturers from South Carolina, have had charge of the engineering work, and both will remain with the company as executives.

The Eatonton Cotton Mills, Eatonton, Ga., recently reported as planning an addition, will build a one-story structure, of standard mill construction, containing approximately 20,000 feet of floor space.

The West Point Manufacturing Company, West Point, Ga., is reported to be considering building another extensive water-power plant on the river below its present large hydro-electric development.

A new cotton mill about twice the size of the old Marion Mill is assured for Marion, N. C., according to report. A tract of 300 acres has just been purchased and surveys are

now being made. It is reported that the Baldwin interests are fostering and financing the new miill.

The Baldwin Cotton Mills, Chester, S. C., will install 100 new Draper looms.

The Calhoun Twine Mill, St. Matthews, S. C., will rebuild the plant recently destroyed by fire, and will install 1,200 spindles and complementary machinery to produce 8s yarn. A. S. Smoke is owner.

The Marlboro Cotton Mills, McColl, S. C., are erecting 25 additional modern cottages for their operatives.

Work has started on the erection of an addition to the Juliette Milling Company, at Glovers, Ga., 25 miles north of Macon.

The services of J. E. Sirrine & Company, Greenville, S. C., have been secured to prepare plans for and superintend the construction of the 10,000-spindle cotton mill at the Alabama State Penitentiary, near Montgomery, Ala.

The New England Mill Situation.

The continued labor troubles in New England have brought on a crisis quite like that seen nearly 25 years ago, when one of the leading mill owners in Fall River declared to a legislative committee in Massachusetts that "the acme of prosperity has passed for the cotton mills." He was speaking then of the infantile southern competition, as it now seems, looking backward, and he was protesting against a continuation of the restrictive legislation such as that which has brought on the present troubles.

For after all, the things now asked for by New England manufacturers of their operatives and the public that controls legislation, is an opportunity to meet competition unfettered. It is a well appreciated economic fact of business that mills restricted 12½ per cent in their running time as against that permitted elsewhere, and unable to restore wages somewhere near the level that is paid for similar work done for a common market, cannot long continue to draw upon their reserves without forcing a financial crisis in the affairs of the mill owners.

One of the significant facts of the eight weeks' strike in New England cotton mills has been the disclosure that "popular sentiment" is against the mills. This fact is attested by reporters and correspondents as well as by the files of all the newspapers in and out of the mill cities. It is not uncommon in the experience of New England to find this so to some extent. It seemed to be true in Charlotte, N. C., a short time ago when an unexpected strike occurred there and dragged along for weeks. Ultimately, of course, the truth of an economic situation will be realized by the public even though it must come as it most frequently does, through the selfish route of strangled business. Business men in mill cities find their trade dwindling. Operatives learn after a time that they cannot rely for food on the charity of those who applaud their fighting qualities. In other words, idleness brings its own cure for labor troubles and idleness means losses that finally touch the nerve of selfishness.

For the time being there is a feeling of depression among manufacturers, for as many of them point out, even if they could induce operatives to accept wage cuts and longer hours of work, they will not be able to do much better than barely hold their own in a market such as the cotton goods markets has come to be in the past few weeks. The demand for goods has not been one-half large enough to take care of the output, and in the face of continued curtailment of production, prices for goods have fallen.

The Lonsdale Company of Rhode Island, whose mills make Lonsdale and Hope muslins, and have been closed for eight weeks, have been unable to sell the limited stocks they own at the prices current when the strike began and recently offered them at a cent a yard reduction. The wide sheeting markets have broken and prices have been reduced 7 cents a yard, or more than 10 per cent. Although the Amoskeag Company, the manufacturers of a fifth of the ginghams now being turned out, have not turned a wheel for the past five weeks, the gingham markets in retail channels has slumped in price to an extent that "75 cent" imported ginghams are now being offered in many stores at "42½ cents" and solely because they will not sell at higher prices.

Although the Pacific mills, the largest producer of percales, has entered upon a four-day-week schedule, and only part of the capacity being employed at short time, percales are cheaper than they were and they are not selling to the capacity of the limited output. These things all indicate that the impaired purchasing power throughout the country, beginning with the slump in farm products and ending in unemployment of a general character, has now come to be better appreciated in the inability to sell dry goods in full volume at high prices. The prices for cotton goods that New England mills complain about are not so profitable that even southern mills, running longer hours, care to accept them freely for contracts.

In many respects the situation is unlike anything previously seen in textile labor troubles. Mills in Maine are running 54 hours a week under a 20 per cent wage reduction, the operatives in that state having accepted the conditions without a question. In Massachusetts, the mills in Fitchburg, Clinton, Ware, Palmer, Lancaster, and Chicopee, have accepted the 20 per cent wage reduction and they are running 48 hours weekly. In the same state, mills in New Bedford, Fall River, Lawrence and Lowell, and in some other centers, are running on a curtailed schedule at the old wage rates. In Rhode Island, in the city of Providence, two cotton mills owned by the B. B. & R. Knight Co., are running in full, 54 hours weekly, at the 20 per cent reduction, while other mills owned by the same company eight miles distant, are closed indefinitely. In Connecticut and Vermont all mills are working on the 54-hour schedule at 20 per cent reduction.

While there are about 2,000,000 spindles affected by the strike, there are 9,000,000 or more that are running on the old high wage scales. Many of them are working at a profit on past orders, but most of them are unable to meet the prices now current if they count upon supplying themselves with cotton at 18 cents a pound or higher.

More than in any previous experience of recent years New England is being made the target for all sorts of misleading statements in the newspapers. President Gompers, of the American Federation of Labor, recently toured the section and when he returned to Washington he issued a statement through all the national press agencies attacking not only New England but the South, over the shoulders of New England. He said that the New England mills were

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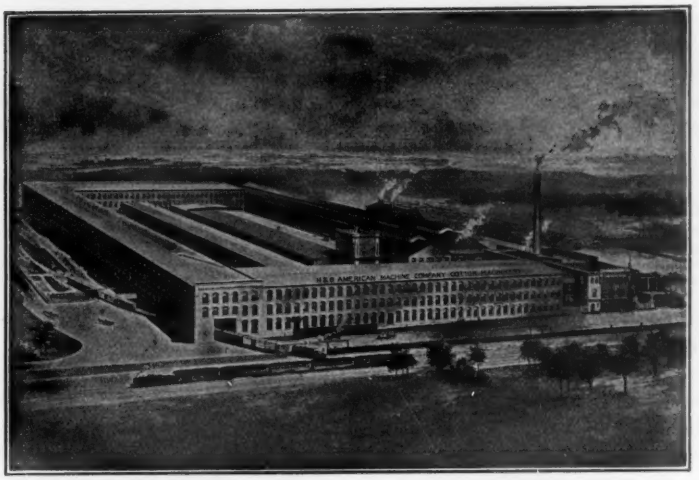

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owned by the same parties who operate southern mills and make "miserable conditions" for their workers. It is easy enough for men in the cotton goods business, familiar with the ludicrous side of this sort of talk, to join in the smile that goes around at such nonsense, but the great bulk of the people who buy cotton goods know little of the truth of Gompers' statement.

That New England and southern cotton manufacturers are not so far apart in their common sympathies arising from their common business is very clearly shown by the return attack made in both sections against Gompers' slander concerning the conditions of labor in the South or in New England. There are commentators whose sympathies with the southern or northern industry have led them into taking the occasion of the Gompers talk as an opportunity for glorifying one section against the other, but the conservative men among New England manufacturers look upon the whole outlook gravely and are seriously disturbed by the immediate prospects.

One of the most vicious attacks made against the cotton industry is that emanating from so-called social welfare organizations made up of parlor socialists who are capable of distorting the facts of industry and capital out of all possible clarity to the man on the streets. At a legislative hearing in Boston, where an effort is being made to change the Massachusetts 48-hour law back to a 54-hour law and to remove restrictions upon manufacturing that are not attempted elsewhere, a man purporting to represent a Labor Bureau in the State, and surrounded in the committee room by a number of Boston women intent on minding everyone's business save their own, went on to talk at length of the great dividends made and paid in the past five years.

But not a word was said about the extraordinary wages paid during the same period, not a word about the enormous taxes imposed on the earnings of capital, and in particular, not one word about the comparatively small dividend rates that would have existed if the mills of New England were capitalized at any where near the cost of replacing the factories at the present time. Figures issued a short time ago showed that it costs about three times as much to build a New England mill today as the capital stock of the mills now represents. Naturally, the dividends on this one-third capital look large, but are they?

The present disposition of New England manufacturers engaged in strikes is to allow the mills involved to stand idle until a change of sentiment among the workers appears. If they cannot carry through their present plans of readjusting production costs, it is inevitable that the mills will be forced out of business anyway. The manufacturers at Fall River and New Bedford are coming close to the point where they must elect to reduce wages or shut down. Orders are not coming in and those that are offered at market prices are too low to permit a profit. Just now they are looking on, hoping that strikes elsewhere will soon be decided in favor of the manufacturers when they too will reduce.

Some hints have come out of certain centers in the past few days to the effect that operatives in the larger centers of New England may accept the wage reductions if no action is taken to fight the 48-hour laws of the state,

(*Continued on page* 449.)

Notes About Men You Know.

JULIAN S. CARR, JR., president of the Durham Hosiery Mills, Durham, N. C., died in a New York hotel at 7:30 o'clock on Friday morning, March 17. Mr. Carr had been in declining health for more than a year, and death followed an illness of several days duration with heart trouble.

Mr. Carr was 45 years of age, and was a native of Durham. He was a graduate of the University of North Carolina and an alumnus of Harvard. Twenty years ago, after completing his education, he assumed charge of the small hosiery mill which was the first of the great chain now operated by the Durham Hosiery Mills. He was the eldest son of General Julian S. Carr, and inherited many of the characteristics demonstrated by his father in his social and business dealings. The marvelous rise and success of the Durham Hosiery Mills, and Durable Durham Hosiery, was developed under the leadership of the deceased Mr. Carr. Beginning with a very limited amount of capital, but possessed with a combination of energy and character, he worked steadily, and guided the enterprise through adversity to the point where he was recognized in the industrial world as the head of the largest hosiery concern in the world.

Mr. Carr was one of the first manufacturers in this country to recognize and develop the possibilities of the "industrial democracy" plan in industry, and inaugurated this system at his plants several years ago. This company was also among the first to construct and equip the homes of operatives on the plan of the modern residential suburbs.

The interest which Mr. Carr showed in the welfare and happiness of his operatives was reciprocated on their part; it would be difficult to find a more popular and better loved employer in this country than he; and his death came as a keen personal loss to all those who were associated with him. His rise to one of the highest positions in the industry did not seem to impose a limitation on his abilities or activities, for he was ever active and energetic in attaining the accomplishments which now stand out as achievements against a background of keen business acumen and integrity, an untiring energy, a capacity for leadership, and a noble desire and purpose in every undertaking. These were some of the characteristics of the deceased Mr. Carr, and perhaps the greatest of his achievements, both to himself and to those who now hold him in reverent memory, was his cultivation of the love and esteem of those who worked with him, in the development and maintenance of the greatest industrial organization of its kind.

Mr. Carr is survived by his wife, a daughter, of the late J. W. Cannon, and four children, Margaret, Nancy, Mary and Julian III. General Julian S. Carr, his father, two brothers, C. M. Carr and Austin H. Carr, and one sister, Mrs. H. C. Flowers, of Kansas City, Mo., also survive him as well as a number of other relatives. The body was returned from New York to Durham, where funeral services were held on Sunday, March 19th.

D. E. TRASK, who for about three years has been connected with the Empire Cotton Mills, Ltd., Welland, Ontario, has resigned this position and has gone to his home in New Bedford, Massachusetts, for a rest before going to another position.

J. J. QUEEN has been promoted from overseer of carding at the Chadwick-Hoskins Mill No. 2, to superintendent of the Chadwick-Hoskins Mill No. 9, at Charlotte, N. C.

T. F. BLUME has been promoted from overseer of carding and spinning at the Norcott Mills, Concord, N. C., to superintendent of the Roberta Mill of the same place.

J. F. JAMES has succeeded M. H. Carter as overseer of spinning at the Social Circle (Ga.) Cotton Mills.

DEAN SUTCLIFFE, who, as recently reported, resigned as superintendent of the Pomona Mills, Greensboro, N. C., has been made superintendent of the plant of Couch Mills, Inc., at Thomson, Ga., and did not go to Augusta, Ga., as previously noted.

MILTON W. HARLOW has been promoted to the position of night overseer of carding at the Whittenton Manufacturing Company, Taunton, Mass. Mr. Harlow has been connected with these mills for several years.

W. E. BAKER has resigned as overseer of weaving at the Hamilton-Carhartt Mills, Rock Hill, S. C., to accept a similar position with the Blue Buckle Cotton Mills of the same place.

JAMES A. WALKER formerly of Gastonia, N. C., has accepted the position of overseer of carding at the Chadwick-Hoskins Mill No. 1, Charlotte, N. C. He was formerly overseer of spinning at the White Oak Mills, Greensboro, N. C., later overseer of carding at the White Oak Mills and also overseer of carding at the Revolution Mills and then overseer of spinning at the Proximity Mills, all of Greensboro. He left Greensboro to become superintendent of the Glen Raven Mills.

C. W. PETIT has resigned as overseer of spinning at the F. W. Poe Manufacturing Company, Greenville, S. C., to become assistant superintendent of the Greenwood (S. C.) Cotton Mills.

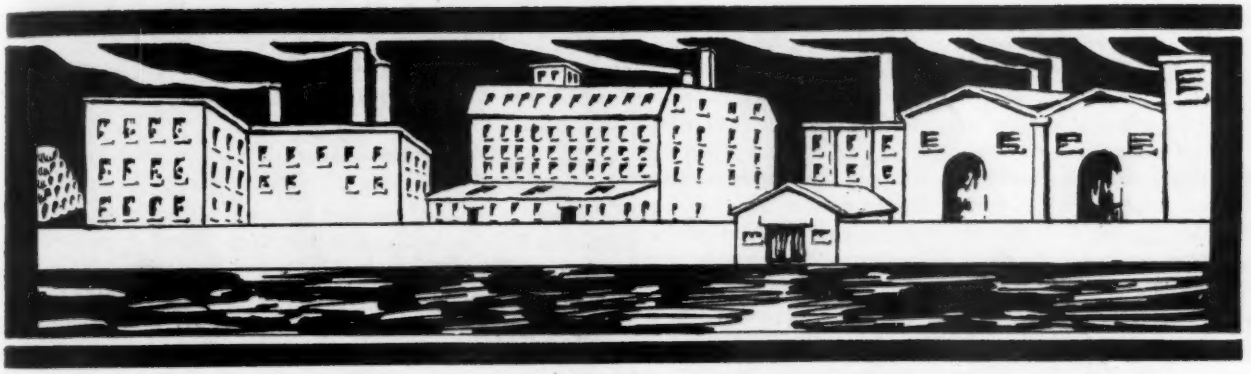
W. F. PETIT has been promoted from second hand to overseer of spinning at the F. W. Poe Manufacturing Company, Greenville, S. C.

C. R. HUGHES has resigned as overseer of carding at the Holt-Granite Mills, Haw River, N. C., to become overseer of spinning at the Pomona Mills, Greensboro, N. C.

C. H. AMICK has accepted the position of overseer of weaving at the Edna Mills, Reidsville, N. C. Mr. Amick was formerly at Buffalo, S. C.

A. J. SMITH has accepted the position of overseer of weaving at the Union Mills, Lafayette, Ga.

YACEY L. YON, who has been identified in various capacities in the textile industry in the South, has become connected with the Textile Products Division of L. Sonneborn Sons, Inc., New York City. He will represent that company in a section of South Carolina, Georgia and Alabama, handling their complete line of "Amalie" textile products, and will have headquarters in Atlanta, Georgia. Among the products he will handle are Glycerol Wax B, a gingham finisher; Sulpho Textol Oil, a hosiery softener; Sono-



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Mr. Yon is the inventor of a self-oiling shell roll for textile machinery, and, in 1911, was awarded first prize in a spinners' contest conducted in Charlotte. In addition to having been associated with some of the prominent cotton mills of the South as overseer and superintendent, he was, for a period during the war, head inspector of textiles for the U. S. Government, stationed at the Philadelphia Arsenal. He also saw active service overseas with the "Old Hickory Division." He recently made a visit to the factories and textile laboratory of L. Sonneborn & Sons, Inc.

HENRY W. SALMON, assistant treasurer of the Whittier Mills Company, Chattahoochee, Ga., who died suddenly on Tuesday morning, March 7th, was widely known in southern mill circles, and was a popular figure among southern cotton manufacturers. His death is regretted by a large circle of friends and associates in the business and social world. Mr. Salmon was a member of the Yaarab Temple of the Shrine, a member of the Bolton Masonic lodge No. 416, and was also a prominent member of the Atlanta Rotary Club. The funeral was held on Thursday afternoon, March 9, under the direction of the Rotary Club of Atlanta. The pallbearers were: Lee Jordan, W. R. C. Smith, J. T. Carroll, James H. Dooley, T. C. Law and Ralph Reed.

Mr. Salmon's philanthropic and unselfish actions were among the outstanding of his characteristics. In the village of the Whittier Mills he was popular among the workers and was greatly interested in their welfare. One of his last accomplishments was the establishment in the village of a night school, where practically every illiterate man in the community was given elementary schooling.

As a man, Mr. Salmon was ever ready to do his part in any worthy undertaking. When called on, he was always willing to respond, ever eager to do a task. Yet, withal, he possessed a very retiring manner, always diffident and modest, and never anxious to secure personal prominence in any undertaking. An affable, unpretentious, true friend, a considerate, sympathetic and ever helpful employer; and an earnest worker, unselfish in the direction of his efforts—"Marse Henry" will be long remembered as one of the best loved members of the industry of which he was a part and in the furtherance of which he contributed an immeasurable service.

J. B. MOORE has resigned as assistant superintendent of the Grace Cotton Mills, Rutherfordton, N. C., to become superintendent of the Lockmore Mills, York, S. C.

B. W. HALLMAN has been promoted to day overseer of weaving at the Musgrove Mills, Gaffney, S. C.

G. W. FELTON has been promoted to night overseer of weaving at the Musgrove Mills, Gaffney, S. C., succeeding Mr. Hallman.

J. W. FERNANDER has resigned as night overseer of carding and spinning of the Ozark (Ala.) Mills, to become overseer of spinning at the Lauderdale Cotton Mills, Meridian, Miss.

J. M. KELLY has resigned his position with the Rainbow Manufacturing Company at Ozark to succeed Mr. Fernander as overseer of carding and spinning at the Ozark Mills.

J. H. MERRITT has resigned as superintendent of the Victory Manufacturing Company, Fayetteville, N. C., to accept a similar position with the Natchez (Miss.) Mills.

A. D. ADCOX has been promoted from loom fixer to overseer of cloth room at the Victory Manufacturing Co., Fayetteville, N. C.

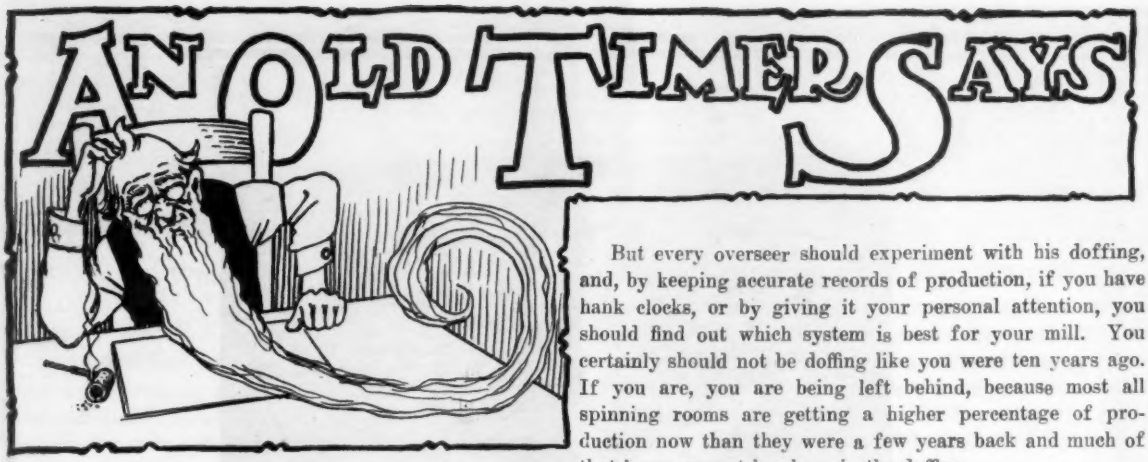
W. H. GODFREY has become cloth room overseer at Steel's Mills, Rockingham, N. C.

ROBERT C. BOGER, president of Boger & Crawford, mercerizers, Philadelphia, who on February 16 was struck by an automobile in Gastonia, N. C., and was taken to the City Hospital in Gastonia, had, on March 8, sufficiently recovered from his injuries to return to his home in Philadelphia.

The fourth edition of the "Textile Manufacturer Year Book," for 1922, has just been issued. This year's edition, enlarged by nearly one hundred additional pages, has been brought up-to-date by the addition of several new features dealing with items which have received development recently, and also includes all the material published in previous editions. To the article on the sizing of cotton warps have been added notes on simple methods of testing sizing materials, as well as additional recipes for heavy warp sizing. Practical notes on the setting of cotton combers, an article on loom settings, notes on ball and roller bearings and chain drive, are among the new features published in this edition. These, however, are only a few of the subjects treated, as the primary object of the book is to provide the mill man with a handy collection of material on the productive and distributive sides of the industry. While the book, which is published in England, naturally refers principally to English machinery and methods, still it contains considerable general and practical information for all mill men and the publishers have made a special effort to include material not readily accessible at other sources. Emmott & Co., Ltd., 65 King St., Manchester, England, are the publishers, and the price per copy is three shillings, six pence net. Interested readers may secure copies from the publishers or through the Book Department of COTTON.

A circular entitled "Money Saving Facts About Cleaning Skylights and Windows," and telling of two kinds of cleansers for this purpose as manufactured by them, has been issued by the Skybryte Company, Bangor Bldg., Cleveland, Ohio. These are the Skybryte ribbed and prism glass cleanser and the plain glass cleanser. Both cleansers, it is stated, are very simple in their application and thorough in their results. The former can be applied by using a brush dipped in the cleanser and then rinsing the surface with water. The plain glass cleanser finds its best use in cleaning clear glass windows where the splashing of water is objectionable and endangers surrounding materials and walls. This objection is overcome with the use of this material, declares the circular.

Southern Textile Banding Mill is the name of a new organization formed by G. F. Roberts, and which is located in Charlotte, N. C. This plant is the first of its kind in the South, and will make braids and braided bands, etc. Mr. Roberts, the organizer of the mill, is a well known southern cotton mill man, who recently resigned as superintendent of a group of mills at Sylacauga, Alabama.



A snow, the first of the season, and bad roads, has confined me to the house. Otherwise, I probably would be sailing forth in my "tin lizzie" instead of sitting here giving vent to some of my pent-up feelings, so to speak. Now, let's see what we will talk about? Not the armaments conference, not the income tax (ouch!), or anything like that, because I am just a common, ordinary cotton mill superintendent, I can't talk about anything but mill work.

Well, anyway, how's business? Got plenty of help now, I suppose, and the work is running fine, too. So what can we take up that will help the old job, anyway?

How about the seconds in the weave room? Have you looked them over lately with an eye to seeing if it is possible to make some little improvement? If the thin places are in good shape probably there is a little bunch of filling that shows up in every few yards where a quill runs out. Do you have the inspectors pull those bunches out? If so, suppose you bring the second hand from the filling spinning down and let him see how many bunches the inspectors are having to pull out. He will be surprised.

Then suggest to him that he bring the doffers down, a few at a time, and let them see the bunches they make by bad piecing up. (You get out of the way—let the second hand do it.) Doffers are older and of a much more intelligent type than they were a few years ago and you can accomplish a great deal more than you probably think by appealing to an operative's reason, by showing him what actually happens when he pieces up wrong.

Very few overseers and superintendents today are taking advantage of educating their help. When you jump on a doffer up in the spinning room when you see him high-end-piecing, does he really know how much damage that bad piecing will do to the cloth? We are all human beings, you know, and if you take the trouble to show the doffer the cloth and the results of bad work on his part, he will realize much more the justice of your complaint when you catch him in the act.

How do you doff, anyway? Do you still work four doffers to a frame? Many mills have found that one doffer to a frame, especially if he is a good one, will get more production than when they had four to the frame. Of course there is much room for argument for both systems, and probably local conditions at one mill would cause one doffer to do better and at another mill it would be different.

But every overseer should experiment with his doffing, and, by keeping accurate records of production, if you have hank clocks, or by giving it your personal attention, you should find out which system is best for your mill. You certainly should not be doffing like you were ten years ago. If you are, you are being left behind, because most all spinning rooms are getting a higher percentage of production now than they were a few years back and much of that improvement has been in the doffing.

Do you let your doffers leave their work as soon as they get around doffing? Why? Doesn't the spinner stay at her frames practically all the time? Doesn't the section man stay at his work all the time? Then why do you let the doffer be away probably a third of his time? He is getting pay for that time—why not utilize it? If you don't know what you could have the doffer do during the time he isn't doffing, ask Cotton and maybe some boss spinner will come across with a good idea.

Are you having any ropy filling in your cloth? Try speeding up the traverse on a few filling frames and send that filling to a certain section or set of looms to see if it does any harm or good. Might try making the taper just a little longer, too. Of course you are sure that all the lost motion has been taken out of the traverse motion; the pitman roller is not stuck and there is not the least dwell in the traverse at either top or bottom.

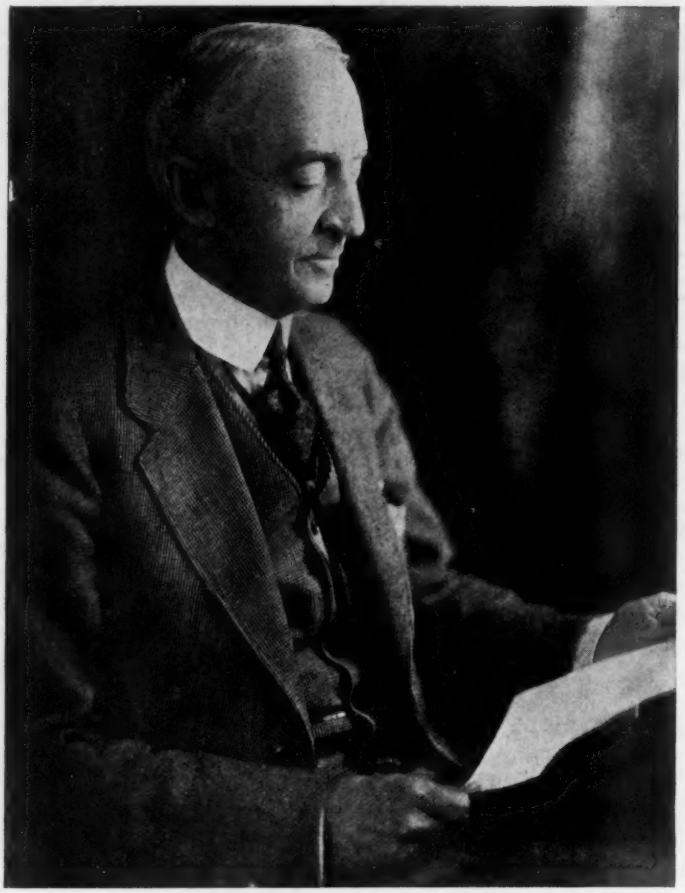
I have heard overseers say that those things were all o k, and then see them get very much surprised upon going to the frames and giving them a very close *personal* inspection. *Get the hint?*

Suppose you ask the cloth room man to keep a record of the places, large and small, of ropy filling he has in a week, then, after doing what you can to your frames, ask him to keep another record, and if there is no improvement (but very likely there will be) write to Cotton about it giving all the details, number of filling, style of cloth being made, size ring, size of bobbin and length of traverse, speed of traverse and spindle speed, style and weight of traveler, etc. I am sure some contributors will be able to give you an idea or two that will help out.

By George! Isn't that just like a mill man? I got started and took up all my allowance of space talking mostly about filling spinning, when I fully intended to mention a few things on warp spinning and spooling. Well, I'll try again sometime.

Instill into your section men the same confidence you have in yourself and you will have a loyal set of men. Loyalty means cooperation. Cooperation means more production. More production means that your employers will begin to take notice, and that is a blamed good start toward a better job.

Remember, when you are resting you are rusting.



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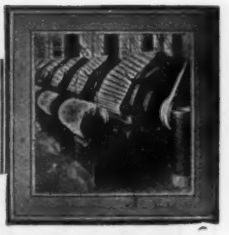

We invite our readers to make use of this department for the discussion of any and all problems arising in the mill or the finishing plant. Questions, answers or letters need not conform to any particular style and will be properly edited before publishing. The editors do not hold themselves responsible for any statements of opinion or fact which may appear in this department unless so endorsed. This department is open to all.

What Is the Answer?

EDITOR COTTON:

Of the subjects being discussed in your Practical Discussion Department, and in the sectional meetings of the Southern Textile Association, as reported in your magazine, the one that strikes me the most is that of picking. I have had about 25 years experience in the mill, and up until three years ago, I had about the same idea on picking as other mill men, that is in regard to speeds, settings, beats to the inch, etc. Lately, however, I have changed my ideas on the subject, although I know it is against all past theory and practical experience, but as the old saying goes, "The proof of the pudding is the eating thereof," so I judge by the results obtained.

The superintendent has told me a number of times that I have kept the best numbers and cloth weights of any mill around here. Just recently reports on warp beams were 350 pounds for 15 days in succession. For five months they stood between 350 and 347 pounds. We are running about 40 different styles of cloth, and I keep the weights of everything, warps and all filling, right in the card room. I have charge of two mills as carder, 100,000 spindles altogether, and during the last three years there has never been a change made on warp spinning frames in either mill. No change in No. 2 on filling, and No. 1 Mill changed only twice on the 42s.

We make 40s, 38s, 36s, 34s, 32s, and 30s filling and all warps are 30s. The yarn is breaking above standard, averaging 65. We are using 1 1/16-inch cotton, and most all the mills around here are using the same—about a dozen that I know of—and their break averages about 52 to 54 on 30s, and their pickers are set as usual, beating about 50 or 60 to the inch.

I have sent you four size reports made out and signed by the boss spinner.

My reason for giving you full details before coming to the point is that I want your readers to pause for a moment before they start to fire bricks at me, and I expect some to say "He is beating the cotton all to pieces and is breaking all the fibers," etc. I will say now that I am beating from 100 to 110 beats to every inch of cotton. When I was beating about 55 my breaking strength averaged about 54.

I changed from three processes to two processes of picking. At first I had five finishers doffing in 11 minutes, and 5 intermediates the same. Beater speeds, 1,200 r.p.m. I left the beater speeds the same and decreased the speed on the feed to where they doff a lap in 22 minutes. I also changed my intermediates over into finishers, and now I have 10 finishers doffing 22 minutes each. I would suggest to "K. C. (Conn.)," who has a letter in the February issue, to try this out; try one picker say for two months and take a size and break once a day. He can save one man's labor which is equal to about $750 a year, and also reduce his repairs 90 per cent. W. S. (Mass.)

EDITOR'S NOTE.—The contents of the daily size reports have been averaged and placed in tabular form for convenience in reproduction. The figures given are the averages of four sizings in each instance. The standard weight for beams at the No. 2 Mill from which these reports were taken is 388 pounds. The figures follow:

	Filling Numbers					Nos. Warp		
Date	34s	36s	38s	40s	42s	30s	Break	Beam Weight
Feb. 9	35.40	35.57	37.95	39.43	42.25	29.43	64	390
Feb. 15	36.26	36.12	37.76	39.42	43.25	29.12	65	390
Feb. 16	36.37	36.21	37.79	39.04	42.39	29.21	65	391
Feb. 23	35.26	35.57	37.46	39.84	42.52	29.54	65	388

Figuring Production.

EDITOR COTTON:

We have just installed a cost system in our mill, and found that it was necessary to measure the weight of finished yarn very accurately. We did not have hank clocks on our spinning frames and could not get them at once, so we bought some plain revolution counters and put these on the front rolls of all our spinning frames. These rolls are one inch in diameter, and, of course, we can get the revolutions of the front rolls very accurately for a day's time from our counters, and with this information we can figure the exact number of yards of cotton ribbon that will be delivered by the front rolls in a day's time, but, of course, we have to get this to a pound basis and naturally have to figure it on the finished weight of our yarn which is 14½s. I am sure that one yard of finished 14½s yarn will weigh considerably more than one yard of cotton ribbon as delivered by the front rolls of our spinning frames. In other words, I believe there is a shrinkage on every yard of ribbon delivered after the twist goes into same, and in getting our production to a hank and pound basis for a day we of course are counting this ribbon as weighing exactly as much as finished 14½s yarn, while I believe there is at least 10 or 15 per cent difference here, but have been unable to find any accurate way of figuring this and would appreciate the help of the readers of your discussion department.

In talking this over with a machinery man he admits

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that twist will shorten the yarn somewhat but as the twist runs back clear to the nip of the rolls, the delivered amount will be correct in weight. As proof of this he cites a twister, for example, over which two single 20s are being run to be twisted into 10s 2-ply. The single yarns are 20s and the 2-ply yarn is 10s despite the twist that is being put in.

On the other hand, a mill superintendent in discussing the question advises that the hank clocks on his spinning frames always indicate more production than he really gets, and, in fact, will figure a greater quantity than is being delivered to the spinning room by the card room.

Will someone please tell us the answer?

Contributor No. 101.

EDITOR COTTON:

"Contributor No. 101," who is evidently a cost accountant himself, will be disappointed to learn that there is absolutely no correct method of determining the pounds production which a spinning frame will produce by theoretical means.

I say "disappointed," because a real cost accountant with a passion for accuracy likes to look at things as if they were so many dollars. If there is a stack of dollars on a table and to this stack are added 10 dollars per hour, there will be 100 dollars more on the table in ten hours—that's the kind of situation which the cost accountant can really handle. This is not said in derision, for the writer admires the spirit of knowing and not estimating that dominates the accountant's mind. One of the best trends of the times is the attempt on the part of the mills to know their costs and quit the old "rule of thumb" which divides the production into the labor cost and gets the cost per pound.

There is only one way to accurately determine the production of any machine in a given time and that is to weigh the total production in that period of time. A spinning frame should have every doff weighed and from this doff the empty bobbin weight should be subtracted. After this has been carried out for a few weeks, along with the theoretical determinations, the degree of error of the counters can be computed and then the tedious weighing process be omitted.

The questioner is certainly correct in saying that the yarn contracts in length after leaving the front roll and this certainly makes an error in the revolution counter's results. This contraction depends on the twist, but will amount to about two per cent on the yarn in question.

And right here is another point I would like to make: Machinery men should not give laymen any information unless they know what they are talking about. They are simply balling things up more for the disturbed mind of the non-mechanical man.

There is absolutely no basis of reasoning in the information which this machinery man has given in connection with this question. Now listen to his words of wisdom! He states that the yarn does contract, but since this contraction extends clear back to the nip of the rollers, that some strange process takes place which makes the roller take cognizance of what is going on. They then hump it up a little bit and whisper to the clock not to count the extra revolutions, for they are to make up for twist. What could be more foolish? Then he takes more rope to hang himself and shoots off to twisting plied yarns with absolutely no connection with the problem at hand.

If we will presume for the sake of simplicity that we are making 10s yarn from 1 hank roving, it will help to make the matter clear. We will have a draft of 10 in this case. As a matter of fact, every mill man—not a machinery man—who reads this knows that if he were to take 1 hank roving and draft it ten times and then put, say, a warp twist into the yarn, he would have a heap heavier yarn than number 10s. Why? Because the ribbon of yarn as it passes under the front roll is about two to three per cent longer than it will be after it reaches the bobbin.

The errors which the clocks on the spinning frame fail to show are: waste during spinning, such as invisible flyings; stick waste, etc.; the clocks count the ends which are down as well as those up, which will amount to about one or two per cent of the production; and also they do not allow for contraction due to twist. The total of these errors might be as high as four per cent of the production when figured against the theoretical production of so many ends for a given period of time.

I quote the following from "Textile Texts":

"To find what per cent yarn contracts in twisting:—Divide the number of the yarn by the product of the draft and hank roving, and subtract the quotient from 1. Example: Suppose No. 28.5 yarn is being spun from 4 hank roving, with a draft of 7.26. $7.26 \times 4 = 29.04$. $28.5 \div 29.04 = 0.98$, which subtracted from 1.00 leaves .02 or two per cent = the contraction in length."

The contraction of plied yarn twisting is a very complex and different matter from the contraction in the single yarn. In the first place, sometimes the twist put in the plied yarn will be such that it will show no contraction, due to the fact that it is taking twist out of the single yarn while it is putting it in the ply. This causes a balance and no change in length will take place. Generally speaking, the plying of yarns causes more contraction in length, varying anywhere from one to five per cent, depending on the ply and amount of twist.

My advice to "Contributor 101" is to first determine the percentage he shows as being lost on the spinning frames as determined by the revolution counters and the actual weight of production. He will then be in a position to accurately *estimate* how much his frames will produce in a given period of time.

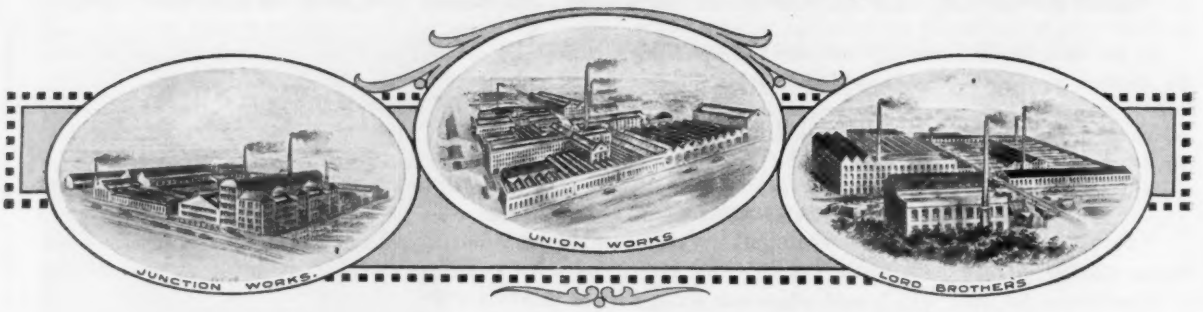
Contributor No. 22.

EDITOR COTTON:

Replying to "Contributor No. 101," will say that the question of the amount of contraction that exists in twisting both roving and yarn is one that has had quite a good deal of discussion in the past, and experiments have worked out a fairly average percentage of contraction as to just how much the yarn is actually shortened.

The method of determining the amount of contraction is as follows: The roving to be drafted is sized a number of times—from one bobbin if single roving; from two bobbins if double roving—and the average ascertained. Multiply this hank roving determined by the draft figured from the gears. This will give the yarn that should be delivered theoretically. Next is to actually spin enough yarn from this bobbin of roving used in sizing to determine the actual yarn being made. It will be found that the yarn spun will be coarser than that figured from the theoretical draft.

LORD BROTHERS



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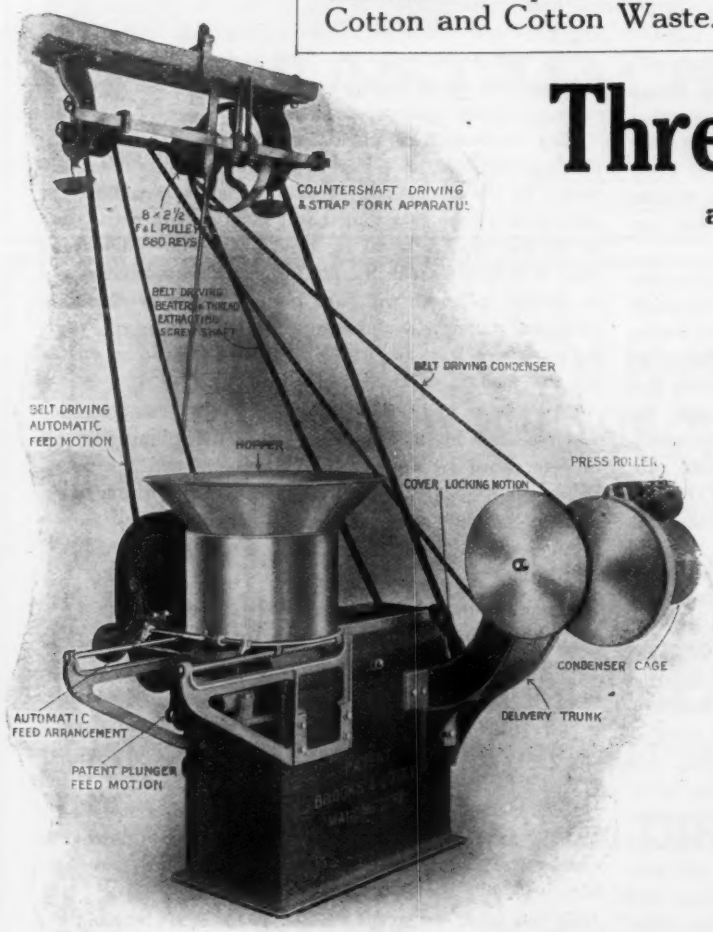
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THIS machine extracts the hard ends or threads from clearer or crow waste in a much quicker and more efficient manner than is possible by hand labor. The waste can then be mixed with the raw, unworked cotton and passed through the various processes without being a source of injury to the Card Wire or having a detrimental effect on the yarn.

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Cables: "LORDS, TODMORDEN, ENG. **Codes: A.B.C. 5th; Bentley's, Lieber's, A.1., and Western Union (Universal)**

CANAL STREET WORKS, TODMORDEN, ENG.

INCORPORATED IN BROOKS & DOXEY (1920) LTD.

Subtract the difference in the yarn numbers, divide by the theoretical yarn number and this will give the percentage of contraction of the yarn.

We know that when the yarn is being drafted by the rolls the fibers are nearly parallel and when the twist is inserted they assume a spiral shape; then this contraction in length is necessarily a contraction of a function that constitutes the yarn number.

The writer has used the following table in figuring all calculations for drafts and production and has found them to be fairly accurate in all details and close enough for all practical purposes:

Contraction for Slubber Roving, one per cent.
Contraction for Intermediate, one per cent.
Contraction for Fine Roving, one per cent.
Contraction for Warp Yarn, four per cent.
Contraction for Filling Yarn, four per cent.

J. W. R. (R. I.)

Points on Making Belting Duck.

Editor Cotton:

We are interested in having information relative to the breaking strength on belting duck, made out of yarn sizing 6s to 8s, and we would be very glad indeed to see in your "How Other Men Manage" Department some lay-outs as to weights through the mill, also card settings, speeds, etc., on the various machines which would be most contributory toward the maintenance of a good breaking strength on this material. Belting Duck.

Editor Cotton:

Replying to "Belting Duck":

There are a number of important things to take into consideration in order to get a good breaking strength and of course the first is cotton. I don't believe any man can make a weak cotton break strong, but I do know that some men get better breaks than others using the same quality of cotton. This is, of course, in the machinery arrangement and the proper handling of the cotton all through the mill.

First, "Belting Duck" should select his cotton as to staple and strength. The cotton may all run 1-inch staple, but it does not necessarily follow that it is all of the same strength. He will probably have two or three different characters of cotton; then he should select a mixing from the lot, not the best, but a general mix of the entire lot, and open as many bales as space will permit. It should be mixed thoroughly in the opening room, and not allowed to be fed into the machines from the bales. I have tried this system and found that to get it fed properly in this way, it is necessary to stay in the opening room all of the time. However, if all the bales are torn up and mixed thoroughly on the floor, a very even mix will result.

Next, if he doesn't have a first-class carder, he should get one as quickly as possible. He shouldn't let a few dollars in salary stand in the way, as a good man in this position will save his salary several times.

Then, he should set his picking and carding machinery to suit the character of cotton being run. Let him make several tests with different settings until he finds the best, and then adopt this as long as the cotton remains of the same character.

I think 50 to 60 blows per inch is a good beat. I have gotten better results with this than any other. This has reference to the finisher; 26 to 30 is sufficient on the breakers. I believe that too many beats takes the life out of the cotton.

His card draft should be as near 100 as he can get it, and he should make experiments here for his settings. It is not always the cleanest carding that gets the best strength. The best settings may leave the sliver a little specked, but most of this will be removed in the other processes.

He may not be able to get the draft he wants on his machines, but he should try to get as even a draft as possible all through to the spinning. He should keep the machinery well oiled so there will be no tight rollers, and keep chokes out of the rollers. He should watch the travelers on the spinning and twisting and not allow them to run too long as they will wear sharp and injure the yarn.

I don't think it possible to furnish "Belting Duck" with actual figures on settings and speeds unless we know something of his lay-out and what character and staple of cotton he is using. If he will furnish the following information, I am sure some of us can furnish him some figures that will be of interest:

What is the character and staple of cotton?
How many processes of picking?
Weight of lap from finishers?
Weight of card sliver? (Lightest weight he can run to keep up.)
Weight 1st drawing sliver.
Weight 2nd drawing sliver.
Hank roving on slubbers.
Hank roving on speeders.
(We presume that he uses single roving on spinning.)

Superintendent (Ga.)

Editor Cotton:

In regard to "Belting Duck's" letter requesting information for maintaining the breaking strength of his goods, will say that the problem of making yarn of good even strength, of the coarser numbers, is probably receiving more attention at this time than ever before. The manufacturers who buy their yarn and weave duck for belting purposes are finding it very difficult to get yarn which is satisfactory at a fairly low price. The problem is to get a uniform strength. The break will show quite good and high on some days and then the next day, for some strange reason, will show up disappointingly low.

This is, of course, due to irregular length of staple in the yarns used for this purpose. Therefore, the first requisite for producing satisfactory belting yarn is to carefully select the cotton and keep a uniform staple as far as possible. It will even be better to sacrifice extra staple for uniformity.

The speeds and card settings will depend on the grade of cotton and length of staple. These cannot be decided off-hand, but must be determined by experimentation.

Following will be found a lay-out which has been used on this character of yarn. It will be seen that the card production is high, and that the whole lay-out was decided upon to produce as cheaply as possible a satisfactory yarn for use in belting. The cotton used was 1-inch staple, Strict Low Middling. The lay-out follows:

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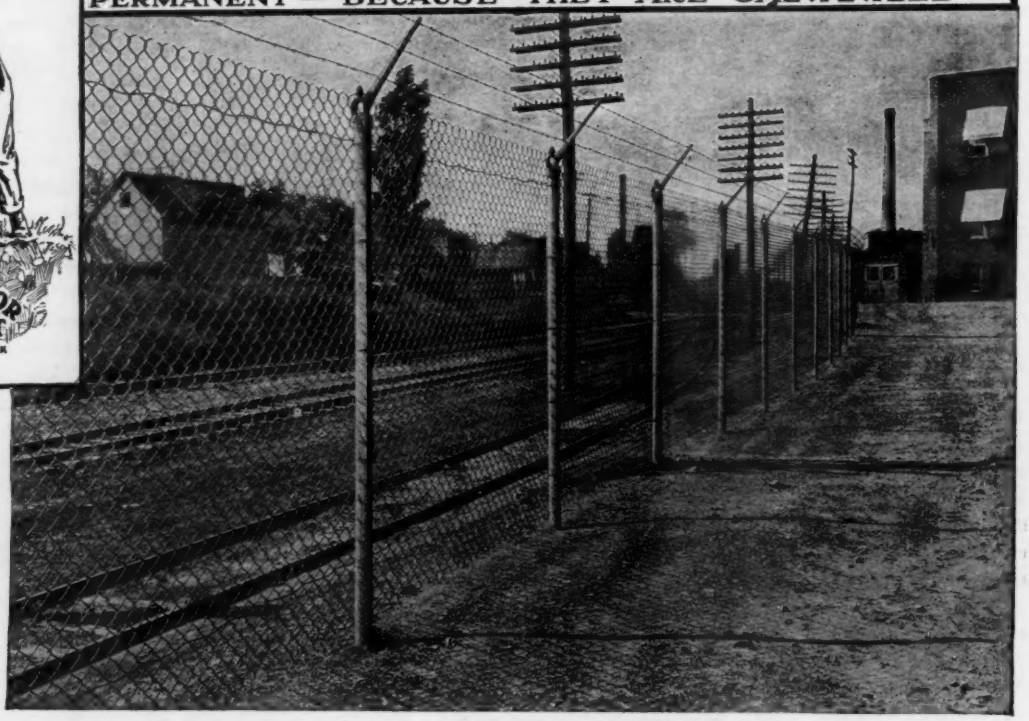

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Laps, 16.25 ounces.
Cards producing 175 pounds per ten hours.
Card sliver, 65 grains; draft, 109.
First drawing sliver, 70 grains; draft, 5.06.
Second drawing sliver, 72 grains; draft, 5.83.
Slubbers, .43 hank roving; draft, 3.71.
Speeders, 1.40 hank roving; draft, 6.51.
Spinning, 8s yarn; draft, 5.71.

Contributor No. 22.

Production Percentages.

EDITOR COTTON:

I read with much interest the various articles in the February issue of COTTON, and being of a naturally disagreeable nature, I will have to take exception to one statement made by "J. F. L. (Ala.)" in the "How Other Men Manage" Department. He claims that the production in his weave room is from 99 to 103 per cent. How come?

Surely he does not trace it back to the picker room, where with six finishers, he was making a lap every six and a half minutes, or 552 laps every ten-hour day (100 per cent production) and changed it to nine finishers, making a fourteen-minute lap or 378 laps every ten-hour day (100 per cent production).

Now wait a minute, I'm not criticizing his picker room organization. If he could afford to reduce his production in this department approximately 32 per cent, I congratulate him, and hold with him that it will show up in the finished yarn, but my argument goes back to that 99 to 103 per cent production.

The most any loom, or any machine in the mill, can do is 100 per cent, and this can be accomplished only when the machine does not stop for any cause whatsoever during the running time specified.

Now don't come back and say that the magazines are filled just before noon, and the looms left running during the noon hour without weavers, and also half an hour after bell hours, those looms are running, the power is running, the weavers are paid for what is woven, and this extra time is to be figured with the production.

100 per cent production is all that a machine will turn out, no matter how good the material is that is in it.

There is no such thing as 103 per cent, except in war profits.

H. E. F. (R. I.)

Some Questions on Slashing and Weaving.

EDITOR COTTON:

I have been interested in reading the series of articles in COTTON on "Slashing Cotton Warps," and would like to ask for some further information along this line.

Would it pay to put in a circulating system of sizing, having a storage tank or kettle and another one in which to cook the size, where the mill has only one slasher? I am of the opinion that it would pay, but would like to have the opinions of other readers on this point.

Also, how much steam should be carried on the cylinders to dry 2040 ends of 22s yarn, sizing for 9 or 10 per cent?

What speed is best for production on a 36-inch Model E Draper loom on 56x60—4-yard goods?

Sandy (N. C.)

A Ball Warper Difficulty.

EDITOR COTTON:

What will stop the ends on a Denn warper from sagging or running loose on the roll, and what will make the yarn lie smooth on the ball and stop the layers from slipping after being wound on the ball? This refers to a regular geared Denn warp machine, with a drive roll having a circumference of 2/9 of a yard, and balling machine with 6-inch diameter roll.

Bob (N. C.)

EDITOR COTTON:

In reply to "Bob's" question regarding trouble on his Denn warper:

He says the yarn runs loose on the ball and that the machine is a regular geared one. I will state, from an experience similar to "Bob's," that ball warpers, as geared when sent out from the makers, will make a nice and properly laid warp, square at the ends of the ball, up to 300 pounds net, on a certain size strand—that is to say, the number of ends and the number of the yarn that the mill had in mind when the warpers were bought. For instance, if he were running on 30s/1, 2000 ends, and got a good square end and an even laid warp was being produced, well and good, but if the mill is forced to change the number of yarn, say to 20s/1, with the same number of ends, then, unless he can change the gears that drive the traverse so that the lay will be more open, or about 20 to 25 per cent faster, the warp will bulge so that he cannot make a ball warp at all, as it presses out beyond the ends of the warp roll.

Now some makers of ballers have a place to change gears, just to take care of such emergencies; others have not. My own experience was on long chain, ordinary section, ball warpers, positive geared for traverse: We had been running for years on a small number of ends, 8s to 12s yarn, but along in 1916 we had all the warping we could do on 13s/3 khaki. These warps had about 450 ends and weighed about 300 pounds. The first warp I tried out commenced to bulge out before the first 100 pounds was on, and as there was no change on the machine, I just stopped and looked the thing over. I reversed the worm shaft so as to have the long end or gear end at the opposite side of the baller, and then had the machinist cut two new gears and put them on the opposite end, raising the speed of the traverse in this case 1/5th. I got going anew, and the result was as fine a built ball warp as could be made anywhere.

I have two warpers changed in this manner, and they make a small warp also without closing up. The lay on the latter is somewhat open but does no harm.

Not having seen "Bob's" warper in operation, I can't say much more regarding what would be the best remedy in his case. I trust, though, that all of the others of COTTON'S readers, who have had plain sailing, and some troubles too, will tell us some of their experiences. I believe "Bob" will come out all right after he looks the situation over a few times and tries out the suggestion of open lay for his trouble.

Furthermore, I might add, there is quite a difference in the two systems of warping referred to. The long chain balling part does all the pulling, whereas on the Denn warper, as a rule, the rollers above pull the yarn from the

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creel and deliver it to the baller, so the latter must be speeded to take care of the delivery. But the speed of the traverse in any case ought to be according to the size of strand being run to make a good ball. Mack (Ga.)

Answers Question on Metallic Rolls.

Editor Cotton:

Answering the questions of "J. F. L. (Ala.)" in the February number:

In setting metallic rolls, there is one broad principle that must always be followed, as on all other rolls, and that is: the distance between the bite of each pair of rolls must always exceed the average length of the staple being used, and that high-speeded rolls require wider settings than those having a slower speed. When running 1-inch cotton with a 40 to 60 grain sliver, the distance between the front and second rolls should exceed the average length of the staple by one-fourth of an inch; between the second and third, one-fourth of an inch; and between the third and fourth, three-eighths of an inch. Although I give the same distance between the second and third rolls as that between the first and second rolls, a wider setting is in reality obtained here because of the coarser pitch of the third roll and also because of the difference in the size of the roll, which brings the bite nearer the center of the third and second rolls.

When the speed of the front roll is about 375 r.p.m. to 400 r.p.m., for the same weight sliver under the same conditions, the distance between the front and second rolls should exceed the average length of the staple by 5/16ths of an inch. Over 400 to 500 r.p.m., by 3/8ths of an inch.

When setting metallic rolls, the distance determined by the length of the staple should be measured from the bite of the rolls, and not from center to center of rolls, as on leather-covered rolls, and this is the reason for the wide settings given. Many carders have conceived the idea that the bite of metallic rolls is at the bottom of the center flute, so they have the same distance between metallic rolls as on leather rolls. This produces a cut web, but the fibers are not injured as many men would have us believe.

The top rolls are positively driven by the flutes of the lower roll meshing with the flutes of the upper rolls. The bite or pressure on the fibers is equal only to the power it takes to revolve the top roll, which will be admitted is very slight, and for this reason, even if the rolls are set too close, the fibers are never injured.

Metallic rolls revolve on collars which prevent them from coming into too close contact. If the collars did not keep the rolls partly separated, the fibers would be damaged by the contact of the flutes. Thus it will be seen that the bite of the rolls is on the side, and not in the center, also on the side of the flute, and not at the bottom. Owing to the meshing of the flutes the cotton does not follow a straight line, and the cotton is crimped to such an extent as to give the extra production claimed. In order to accomplish this, the collars must be in contact at all times. If the collars of any of the top rolls are not in contact with those of the bottom one, a cut web is the result for the simple reason that the draft is increased due to the crimping action being destroyed. When such conditions exist, the trouble is as follows: the slivers fed are too bulky or the rolls are weighted too lightly, and possibly the journals of the top rolls may be dry, which demands more power to revolve them and causes them to raise.

The flutes of the back rolls are of a coarser pitch, owing to the greater bulk of cotton that comes under their action, and should be weighted with 18-pound weights. The third roll should be weighted with 16-pound weights and also the second roll. The front roll should be weighted with 12-pound weights; the reason for this is that more weight is required on the second roll to insure a firmer grip on the cotton, which is necessary in order to have a positive draft.

Some prefer to have the heaviest weight on the front roll, claiming that as this roll revolves at the highest speed, more weight is required in order to keep it steady. This holds good for common leather rolls, but not for metallic rolls. The collars on a 16-pitch roll are .07 smaller in diameter than the boss of the roll; on a 24-pitch, .06 smaller; and on a 32-pitch, .044 smaller. The collars are made of a smaller diameter than the boss of the roll, so the rolls will mesh with one another, causing an amount of overlap sufficient to grip the fibers. The number of flutes on the boss of the roll determines the pitch. If a roll has 32 flutes it is known as a 32-pitch roll.

The only disadvantage of metallic rolls is the possibility of some hard substance lodging in the flutes, and thus preventing the sides of the flutes from coming evenly together at this point, and the result is a cut web.

The cleanliness of metallic rolls is important, because if foreign matter which collects in the flutes and in the bearings of the rolls is not removed, bad work will result from the cotton adhering to and winding around the rolls, thus making waste with subsequent loss of production. The rolls should be taken out in order to properly clean them and to clean the bearings.

The length of time between scouring depends largely on the cleanliness of the stock used, and the amount of work required of the machine. However, this time should never exceed four weeks. In scouring, the rolls should be taken out in order and replaced in the same way. If they are mixed or turned end to end they are liable to give trouble.

When a web or two appear sagging slightly, the other webs should be observed, and if any appear to be tight, the rolls should be changed and the top roll that is running slack put in the place of the one running tight. If there is a slack web and all rolls are okeh, the trumpet should be changed to one with a larger bore. If the web is too tight, a trumpet with a smaller bore should be used.

"J. F. L." and others should keep the following in mind, when running metallic rolls: When the space between the first and second rolls is too wide, the webs will sag, while on the other hand, if the space between the same rolls is not wide enough, the webs will pull apart in spots, termed a "cut web." In such a case as this, to condense more or less at the trumpet will not improve conditions.

I hope these remarks will help "J. F. L." and that now he won't attempt to change the pitch of his rolls.

Wash (Mass.)

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Card Clothing.

Editor Cotton:

There has been some discussion lately in regard to card clothing, and I am prompted to make a few remarks on this very important subject. As "Wash" says, "E. D. W." has started something that will have a long ending, and I hope the other fellows will come in on this discussion.

As we all know, card clothing is the material with which the cylinder, doffer and flats are covered, and by means of which the cotton is opened and the fibers straightened and laid parallel to each other. It consists of wire teeth, bent in the form of a staple and inserted in a suitable foundation material. The teeth, in addition to being bent in the form of a staple, also have a forward bend from a point known as the knee of the tooth. The bottom or the part of the tooth that is inserted into the foundation is known as the crown. That is on the back of the foundation after the tooth has been inserted in it. The tooth has two points that are on the front.

Although the teeth of the clothing do the actual carding, much depends on the character of the foundation, since if the former are not held with considerable firmness and yet allowed a certain freedom of motion, the best results in carding cannot be obtained. The foundation material must also be such that it will not stretch after it is applied to the card, for if the clothing becomes loose it will raise in places or as it is commonly known, will "blister." When this happens, not only is the thoroughness of the carding deteriorated, but there is also great liability of the clothing itself being damaged by coming in contact with the clothing on the other parts of the card. If the clothing is slack the teeth will not be held up to their work properly. but will be forced backward by the strain in carding the cotton. This will result in neutralizing to a certain extent the effect of the forward bend of the tooth, making the clothing act more like a brush and allowing the cotton to pass without being properly carded.

The foundation material generally used is a fabric woven from cotton and woolen yarns although sometimes cotton and linen, are employed, the linen being used on account of its strength and freedom from stretching. The woolen yarn, however, is well adapted for this purpose as it possesses a certain elasticity that, while holding the tooth in place with sufficient security, allows a certain freedom of movement. This is very desirable since if the card teeth are held too rigidly, there is some liability of their becoming broken.

The foundation is generally woven three or four-ply in order to obtain the required strength and the thickness that is necessary to secure the teeth. A very good foundation consists of a two-ply woolen fabric inserted between two cotton fabrics, the latter imparting the requisite strength and the former giving a firm but elastic grip on the teeth.

Sometimes the surface of the foundation is coated with a veneer of India rubber, but in this there are disadvantages as well as advantages. The rubber has a yielding grip on the teeth that allows it enough freedom to move when the strain of carding is on it, and at the same time it is of a tough nature so that the movement of the teeth does not work a large hole in the foundation, which would render the teeth loosely secured so that the full benefit of the elasticity of the wire could not be obtained.

The India rubber covered clothing is also much easier to strip, but on the other hand, it is not so durable as clothing made with the ordinary foundation. The rubber deteriorates with age, becoming hard and stiff and cracking between the points where the teeth pass through it. This deterioration is much more rapid if the clothing is in a hot room or subjected to the direct rays of the sun, and many times it has been found that the foundation of the rubber clothing was totally spoiled before the wire was appreciably worn. Ted (N. C.)

Recommends Average Carding Speeds.

Editor Cotton:

With reference to the questions of "J. F. L. (Ala.)" in the December number regarding card speeds, I would answer his last question first by saying that card builders advise a cylinder speed of 165 r.p.m. because they have found out from a great number of cotton mills running a great variety of work that this is the best average speed for all classes of cotton and that it gives in general the best treatment of the fiber and the longest life of the clothing. I have always considered it a good average speed that could be exceeded slightly with short strong cotton and one that should be slowed down somewhat with a longer staple. However, I am no advocate of high speed at any time. It is all right to be as up-to-date, modern, progressive, etc., as possible, but it is my humble opinion that high speed in the modern cotton mill does a great deal of harm, and, if I could possibly help it, I would not run a card cylinder over 165 r.p.m. no matter what the conditions.

I do not believe that the centrifugal force on the cylinder would ever be great enough to affect clothing drawn on at 325 pounds, but I do think that with higher speed and running the same production the strain on the cylinder, flat and doffer teeth would be greater and they would all have a tendency to stand up straighter while working and the settings would have to be slightly wider. I should think very positively that under these conditions the clothing would not last as long at 175 r.p.m. and 125 pounds as it would at 155 r.p.m. and the same production. Likewise, it would not last as long at 155 r.p.m. as it would at say 100 r.p.m. Working at slower speed and under less strain the teeth would have a greater resiliency and would be able to take care of lumps without injuring the fiber or clothing which at higher speed would result in cut fiber and damaged teeth. I know that we are not supposed to run such lumps into the cards, but the fact remains that we do sometimes. However, we cannot afford to run cards too slowly or we will not get a production sufficient to pay for the investment and if we run too fast we injure the staple. Hence the happy medium of 165 r.p.m. which has been determined from experience, and the closer "J. F. L." sticks to this the better he will come out both ways.

At a high speed there is no doubt that the cotton will be cleaned more thoroughly, but what's the use of having nice clean yarn that has been worked to death? Every mechanical process is an injury to the fiber. Anybody can figure the surface speed of the cylinder, the number of teeth per minute, the number of teeth per fiber, the number of strokes per teeth per fiber per minute, and so on to his

A SKY LINE AND A DYE LINE

On one side of the picturesque and historic Hudson is the most beautiful sky-line in the world, while on the opposite shore, buttressed by the Palisades, is a great manufacturing center, including Newark and environs.

One of the first to realize the natural geographic advantages of the section for manufacturing purposes was the Central Dyestuff & Chemical Co., which undertook the manufacture of an extensive line of dyestuffs back in 1898. The company makes most of the intermediates entering into the manufacture of its Acid, Basic, Chrome and Direct Colors.

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own satisfaction, but the whole thing stews down to this—every machine the cotton goes through injures it and the more thoroughly it works it the more thoroughly it injures it, so take your choice. If "J. F. L." only wants clean cotton, let him go to it, but if he expects to spin and weave it he had better stay away from high cylinder or licker-in speeds.

I have talked this question over with a carder of a great many years' experience, a man of sound practical judgment, who tells me that he made this test a number of years ago: He had two cards side by side running a 48 grain sliver from a 14-ounce lap, same cotton, same production and all other conditions the same except that the cylinder in one of the cards made 180 r.p.m. and the cylinder in the other card made only 140 r.p.m., with the original pulleys and corresponding speeds for the lickers-in. There was no apparent difference in the running of the work and no difference in the settings, except that the doffer on the high speed card showed a tendency to face and had to be moved off from a 7 to a 10 gauge. The faster card took out more waste but the yarn made from it broke 9 pounds weaker than the yarn from the card making 140 r.p.m. This test was run for about a month and never failed to show approximately this same difference.

If the carding is limited—and it is almost everywhere—and there is no additional space or money available to put in extra cards to card more thoroughly, it would not pay, in my opinion, to go from 155 r.p.m. to 175 r.p.m. on the carding cylinder if the mill is trying to make a high quality of yarn or has any kind of reputation to establish or maintain. It may be possible to do this and get by with it. The difference in the work may be so slight that the spinning, weaving and the quality of the goods may not apparently be injured. If so, congratulations, but from a standpoint of good carding, and by good carding I mean the easiest possible treatment of the fiber as well as the removal of motes, neps, etc., I do not believe it would be advisable.

We have faced exactly the same problem in our plant in the last few months, and decided to put on a night run rather than increase the cylinder speed or the production per card. H. J. (Ala.)

The Importance of the Lay Gear.

Editor Cotton:

I would like to say a few words about the importance of the right lay gear on roving frames to obtain the best work possible. There is a tendency among carders to neglect this important phase of their work. For instance, the query of "Rocky Road" in December Cotton, as to whether changing the lay will stop his frame from running under, is to my mind a very impractical question to ask. If "Rocky Road" has the right lay gear on his frame, this certainly will not cause his frame to run under, and by changing it he is only making matters worse.

The function of the lay gear is to give to the carriage the proper speed, so that the coils will be laid side by side without crowding or leaving any space between the coils. If the lay on the frame does not do this properly, it subjects the work to a lot of evils.

Let us say, for instance, that the lay is too close. By examining roving made with this condition under a pick glass it will be seen that the coils, instead of laying side by side, over-ride each other in numerous places. What is the result? The proper tension on the frame cannot be obtained, for the ends, by over-riding each other, tighten and take up more tension than they really should. This will strain the yarn and cause a lot of breakage, and uneven yarn is sure to follow.

Now let us take the opposite condition. If a frame has too open a lay, the reverse takes place. The tension on the end will cause the coils to make their way into the side of the preceding layers instead of riding flush upon the preceding one. This will cause the ends to slacken up unduly, so much so that it then becomes almost an impossibility to obtain the desired tension. This will also tempt the operator to tighten the ends with disastrous results to the build of the roving.

This matter of the right lay gear is a serious thing when running fine work. I presume that as the work gets coarser, these evils are not so much in evidence, but they are there just the same. V. D. G. (Mass.)

Take Care of Machinery—It Pays.

Editor Cotton:

The most important parts of any machine in the mill are the rolls between which the various ends and slivers must be passed and drawn out, and also any of the channels and surfaces upon which the slivers or ends must slide along during the process of manufacturing.

All of these things are very susceptible to injury, and there is nothing in the mill which can interfere more with the ends and slivers than to have any of these rolls and surfaces out of order.

To enumerate all of the ills to which both the rolls and surfaces may be subjected would be well-nigh impossible. However, here are a majority of them: Rust, nicked, dulled, sticky, oily, dirty, not in line, bent, worn out bearings, worn out roll necks, not levelled, flutings worn out, loose neck joints, rolls insufficiently oiled, set too close, set too far apart, too heavily weighted, not weighted enough, driving too fast, driving too slow, shaky floors causing rolls and surfaces to vibrate, loose roll stands, gears loose on rolls, teeth broken out of the gears on the rolls, grit allowed to get onto rolls and surfaces, waste plugged channels, channels too large, channels too small, channels too loose, gears too large, gears too small, rolls binding in the bearings, gears set too tight, gears set too loose, clearer too heavy on rolls, top clearer out of order and not removing the surface waste enough, no under clearers, weight levers rubbing against the rolls, saddles not oiled and grinding on the rolls, dirty saddles, poorly covered top rolls, drafts too long, drafts too short, stock too heavy, cotton lapped on rolls, trumpet rail rubbing against roll, dirt under rolls, black oil on rolls, thread guides cut in, rolls depressed by constant wear.

There are 52 different matters which have been named, all of which have to do with the proper functioning of the ends and slivers while passing through the various processes of manufacture.

There is hardly a mill that does not have some trouble with these features. Doubtless there are some mills which may have trouble in a much greater degree than others.

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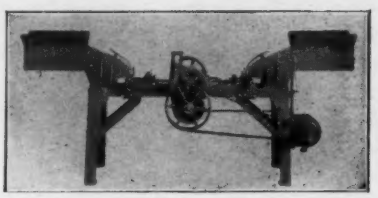

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It is impossible to have the work run properly in any mill and have trouble with these things. It is the easiest thing in the world to interfere with the proper passage of cotton through rolls or upon surfaces which are afflicted with any of the possible defects at these points.

A large number of ends break down constantly because something is wrong. When an end breaks, something caused the breakage. What is that something? That is the all important question to be answered. And the answer will probably be found in the list of possible defects just mentioned.

An end would never break if there was not some unnatural interruption to cause it to sever itself from the previously smoothly running process. And on account of this unnatural action, we have the so-called natural problems of cotton manufacturing. Most of these problems come from some of the defects which interrupt the passage of the slivers or ends through the rolls or along the surfaces, and so "the thread which ran so truly" breaks.

Cotton manufacturing demands a certain amount of manual service in proportion to the intensity of these interruptions. When the work runs good, it requires less service than when it runs badly, when the defects predominate, the work runs badly, and oftentimes the extra help of spare hands must be called into service. The remedy to prevent all of these mishaps is to train our workers to take especially good care of all passages, race courses and rolls upon and through which the ends must pass to be manufactured into a finished product.

One of the great enemies and a sure interruption of smoothly running work is rust. The same is true of oil, dirt and grit, but rust is particularly harmful as it eats into the surfaces of the steel and it will take a great deal of polishing as well as perhaps a good grinding and polishing job to replace the smooth surfaces again. In order to avoid rust, careful attention must be given to avoid dampness and water spills, water and steam pipe leaks. Any of these things will cause rust. Rust is scientifically known as the natural process of oxidation. This natural process eats into and decomposes or disintegrates the molecules which make and retain a smooth surface.

Grit is also especially harmful as this too will nick and imbed itself into the smooth surfaces and do almost irreparable injury. Grit will also make many hairline scratches, which will cause the delicate cotton fibers to catch thereon. Rolls in many mills are frequently damaged by grit coming from sources not generally understood by the average mill man.

First, a common source of grit which gets into the mill is from the smokestack of the power plant, this being usually quite centrally located back of the mill, and the windows of the mill being open frequently—thus when the wind is in the right direction, it will blow the cinders or grit right into the mill and this will start its work of wholesale destruction at once. The remedy is to have all of the windows screened wth fine screen wire. This fine screen wire should be made of brass wire, or the elements will soon destroy the wire. These fine wire screens will also protect the machinery from becoming infested with sand, dust and grit blown in from the ground by the wind.

All of this is much more serious than it would appear to the thoughtless mill man. But these are facts, nevertheless, and the mill man can either face the problem squarely or take the hardships which go with the hazard.

Dirt coated surfaces, and dirt filled steel roll flutings, are always a menace to good running work. Oiled, waxed and gummed surfaces are likewise detrimental to good work. Rolls that are bent out of line, unlevel, and having overworn necks, bearings that stick or gummed bearings will turn hard and with more or less jerky movements. This will make more or less bad work.

Worn out steel roll flutings destroy valuable work, as will also loose roll necks, when loose enough to back-lash.

Then follow the many other important matters which must be looked after, such as the setting of rolls, speeds, weightings, under and overspeeding, too light and too heavy weightings, together with improper settings—all of these will cause imperfect work.

And still the careful mill man does not stop here. There are yet many other things which will need to be followed up. Occasionally there will be found a loose roll stand to be tightened, shaky floors should have no place in any mill, as they will destroy settings, cause rolls to jump, and cause some of the rovings in the creel to unwind faster than desired for the regular roll feedings. This extra unwinding may become entangled with other ends and finally get wound around the steel rolls. Such "bung-ups" have broken rolls, traverse motions, bent rolls and made any amount of thick ends by raising one end of the top roll.

The gears on all rolls should be carefully inspected. Sometimes these get loose on the rolls or there may also be broken teeth. Gears that are set too tight or too loose are apt to impart a rickety motion to the rolls. Under and top clearers that do not function are worse than useless—also top clearers that are too heavy.

A very common evil in connection with the roll system of weighting is to have the stirrups bearing against the steel rolls. This consumes extra power, wears out both steel rolls and stirrups and oftentimes draws the top rolls out of alignment. Saddles should be kept clean.

Overlong and short drafts are not desirable. Neither is it right to attempt to draw roving which is too heavy or too hard twisted. Thread guides which are cut in by the ends should be replaced with new ones. Top roll surfaces are very delicate, and it is absolutely desirable to have the rolls perfectly covered. Depressed rolls should not be used.

From this diagnosis of the many troubles which may exist in varying degrees of intensity in some mills, it can be seen that there is a big call for a careful investigation of the conditions of all the rolls and surfaces through and upon which all of the slivers and ends must pass to complete the cycle called manufacturing. Every defect which is likely to break ends should be found and removed. This not only makes better work but also reduces the magnitude of the service. H. D. Martin (R. I.)

No man is so ignorant but that you can learn something from him.

The value of words is often reduced in inverse proportion to their number.

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A Spinning Room Experience.

Editor Cotton:

Perhaps it would be appropriate at this time to tell of an experience that I had some few years ago when I took a position as overseer of spinning in a New England mill. I have noticed from time to time in Cotton the experiences of overseers and superintendents on their various jobs, but it is rare that we see the real inside dope that many an overseer or a superintendent would or could tell if he were minded to.

I took a job as overseer of 88,000 spindles in what was considered a modern mill. The first morning I started up I walked around with the second hands of the various rooms and noticed a great number of spindle bands flying off, frames stopped, whole frames of ends broken down, and all the doffers sitting down, evidently awaiting the new overseer to see what he looked like. This last is a fact, as I afterwards learned.

Asking the second hands why it was the rooms started up so badly, developed the fact that it was nothing new—it was always like that on Monday morning. It was afternoon before anything was running in such a way as to resemble a spinning room. I noticed the temperature and humidity figures and found them registering 65 and 55 respectively. I noticed we had humidifiers, but found out, in an apologetic sort of way, that 60 per cent of them did not work and had not worked since the Lord knows when.

I immediately got right after the engineer for steam for the heating system. He referred me to the master mechanic, and he in turn stated he would have to see the superintendent. I saw what I was up against, and immediately hiked over to the office. The superintendent hadn't come in yet, but I waited for him, and told him the story. After a while he began to realize the seriousness of the matter, and had some changes made so that I had valves in my rooms connecting the steam. Then I made arrangements with the night watchman to look after these valves, and placed a new thermometer handy so that he could see how the heat was going all night while on his rounds. I then set a gang at work cleaning humidifiers. In some cases we had to get the piper to take off sections of pipe and clean out the accumulated rust of years. We got them all going, however, in about a week, and the following Monday morning we started up as good as if it had been Wednesday. I then began to look around a bit. I set a standard for heat and humidity and made the second hands report the readings four times a day.

There were so many things that needed straightening out that I didn't know where to begin. I took the superintendent in confidence and showed him around the rooms, and I honestly believe that he never realized his position more than he did that day.

I found a lot of frames in one room with "weighted" clearer boards that were supposed by the former overseer to keep laps down. They did nothing of the kind—they created laps. All the leather cots were rubbed so that they attracted every broken end and also made laps. I removed the "weighted" clearers as soon as possible, varnished the rolls with my own preparation to "stall" off matters until I could get all the rolls re-covered, and then got after the band-boys. I asked them all to tie me a knot (this was in my office). Not a single man had been shown how to tie a square knot right, and I patiently showed them how and asked them to tie them that way thereafter and save themselves work and stopped spindles.

The steel roller flutes were badly worn down, and a very light flannel had been used on the leather cots. All the weights were in the last notch, exerting a pressure of about 30 pounds on the front roll, notwithstanding the fact that the drafts had usually been light in this room. I had a 30-ounce flannel put on the rolls, in place of the 25-ounce, giving me a softer cushion which imbedded into the worn flutes easily, and then eased up on the roller weights by several notches. I began to notice results in this room, and so did the spinners. We had several spare hands who generally assisted the spinners and I put them at work scouring. The spinners did not like it for a time, but they soon got used to it. During scouring I removed a great number of worn stirrups, and saw that none rubbed on the steel rollers again.

In the meantime, in another room I was scouring right along and re-tipping skewers. I was sure there was too much twist in the roving, and so was the carder, but it had to be there because if it wasn't, there was breaking back. After re-tipping the skewers I removed thousands of broken creel steps and placed new ones in. Then I had a tooth of twist removed. I followed the same procedure in each room and found it was ok. Then I had another tooth removed and the card room started jumping ahead. It was then a happy time for the carder, but I told him to hold his laugh for a while and see who laughed last. I told him I hoped it would be him, but I knew it would be me.

I then closed up the steel rollers a little and also the top rolls, and I began to get better breaks. After finishing up all the scouring and saddle changing, and with the roller cot flannel changed to 30-ounce instead of 25-ounce, the two teeth of roving twist removed, and the closing up of the roller settings, I then rolled up my sleeves for real work. Here was where I was determined to laugh, for it was a year almost in coming my turn. I quietly got the master mechanic in my office one Saturday morning and told him my story—I wanted to increase my spindle speeds. I knew how far I could go, and meant to travel the whole distance, as the maximum I was after was 9,300 r.p.m., from an average of 8,900 r.p.m. I also wanted to take out a tooth of twist, as I was getting a better break by several pounds than the mill had ever gotten in years.

That Saturday afternoon we changed the pulleys on the frames, all but a few we had to leave over for another week. We also took one tooth of twist out of the yarns. The following Monday was an exciting day for me, but everything started up slick. Even the second hands didn't know it until I told them all in my office during the forenoon. I noticed that the doffers were running around and working harder, and I got many suspicious looks, but not a word did I get.

I then got busy and dropped the spindle rails in two rooms one inch, so that I could use the same size bobbin all around the mill. I then put the doffers on piece work paying them so much a frame for each of the different counts. This is a much better way than by the hank or doff. The doffer knows what he is earning all the time, and he is after increasing his efficiency all the time so that he can swing another frame or two. It works out fine.

I also made yarn changes so that each count of yarn

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was placed by itself. In this way, I was up against ring-spinners carrying travelers around from one frame to another putting a heavy traveler on the fine counts, and a light traveler on the heavy counts. By having the yarns segregated you are sure of no mixups along this line.

Noticing that the spinners had the habit a great many ring-spinners have of carrying travelers in their mouths, which is a sure sign that they will be mixed, I quietly placed a few drops of kerosene oil in the traveler cups on the frames one Saturday afternoon, and there were some wry faces on the following Monday morning. They complained to me about it, but I told them that it was a dangerous thing to carry travelers around in their mouths, dangerous to their health as well as to the work. I outlined the dangers incident upon having appendicitis, and told them never to put travelers in their mouths again. I kept up the kerosene practice, however, once in a while, so that there would be no recurrence of the bad habit.

To culminate my experiences I must not forget to tell what was accomplished, because I know it will make many a spinner feel good. We were running some 60s yarns, about 20,000 pounds a week. We were using a very full 1⅜-inch cotton and of good middling quality. I experimented with a 1 5/16-inch cotton and found that by manipulating the roving twists, and roller settings on my frames, that I got as good a 60s as my other, in fact there was only a pound or so difference in the break. I called in the superintendent after I had the experiment finished and showed him the test. I also made a test on some 40s from full 1 3/16 inch and also from 1⅛-inch cotton. By manipulating the hank roving so that I got a shorter draft, and a closer setting, I demonstrated as good a yarn with the 1⅛-inch cotton as was necessary for our purpose, and which wove just as well; in fact the weavers never knew the difference.

Now we were making about 15,000 pounds of 40s a week, and as I say, about 20,000 pounds of 60s a week. Of course we made a great many more yarns but the two mentioned were concerned in the experiment I made. The result was that we changed our cotton gradually until all our 60s were on the new stock, and also the 40s. I leave it to the imagination of the reader as to the saving, when I say that at the time we made the change there were several cents a pound difference in the cost of the cotton we had been using and the cotton we changed to.

We saved several hundred dollars a week on cotton alone. Our change in spindle speeds, slightly less twist, dropping spindle rails in two rooms, and generally better spinning conditions increased the production a full 12 per cent on the same pay-roll. There was also a saving on the doffing pay-roll over the old method they had of paying by the doff. The cost per pound for spinning also showed quite a drop.

In conclusion, I recommend to spinners generally, to run a roving as slack twisted as is possible to draw in the creel comfortably without breaking. I have heard spinners say the opposite. A spinner once said to me, "If you do that you will have sliver stretching in the creel even if it does not break." Bosh! If roving stretches in the creel there is going to be more or less breakage in the creel, is there not? Out of several hundred bobbins running, surely there will be some breakage, will there not? Therefore, if you have roving that is running and is not breaking back, keep it as soft as you can. Keep the roll settings under the staple wherever possible. Insist on as short drafts as you can get within reasonable limits.

Do not allow the help to use a knife on a skewer, keep a supply of skewers on hand all the time where a spinner can get some, and have the old skewers carefully tipped up in the carpenter shop occasionally. This is really important. Do not have the creel rods too high otherwise the roving will break back, and the carder may get blamed for it.

See that the leather rolls are kept in shape, and oiled with good oil in a careful manner. See that the cots are *cut right through* with a knife before sending out to be re-covered, otherwise roller coverers are liable to use the same flannel cover again. That is, they have been known to put a new leather cot right on over the old flannel. I do not say this is a steady practice, but I know for a positive fact it has been done. Keep the frames scoured, aiming to do so many every week all the time. And do not forget that heat and humidity are the greatest factors for successful spinning. Notice the day and the hour when the work is running slickest. Different mills have different local conditions but once you have nailed the correct heat and humidity and the relative degree, then aim to get the same conditions all the time by artificial means.

Lastly, but none the less important, keep your dignity in a democratic way. Show your help that you are there to show them that it can be done, that it will be done, and that you are enough of a real man to do it. Work with them and all will respect you. Here's good luck to the real foreman with a good American backbone.

Bal (Mass.)

Favors Short Card Drafts.

Editor Cotton:

"K. C. (Conn.)" states at the end of his letter in the February number, "I don't see how it is possible for some carders to stop one process of drawing and gain anything by it. What he gains in breaking strength he is pretty sure to lose in evenness." Now let us turn to the splendid letter written by Ted (N. C.) on page 281 of the same issue.

"K. C." evidently is one who believes in a heavy sheet of lap and a very, very long draft, but he dares not go over 150 inches. Funny, isn't it, if you don't have a draft from 100 to 140 or 150 the mill will go to the dogs, and yet isn't it fair to assume that if increasing the draft from 100 to 140 will make better yarn, why not get more benefit by making it 200 inches? I would appreciate an answer to this question from "K. C.," "A. B. C. (R. I.)" and others.

What is stated in his letter by "Ted (N. C.)" is a fact. I can furnish the name of a mill here in Massachusetts that is running without any intermediate pickers, and with two processes of drawing; and the strange part of it is that this mill makes high-grade yarns and never runs short time when most of the other mills here do. But they don't run a 14½ ounce lap, nor a long draft on their cards.

To quote "K. C." further, "It stands to reason," says he, "that a mill cannot cut out the intermediate pickers with four doublings and an evener and get as even work or as clean work." But what's the use of argument when it is being done and I am willing to prove it. However, in

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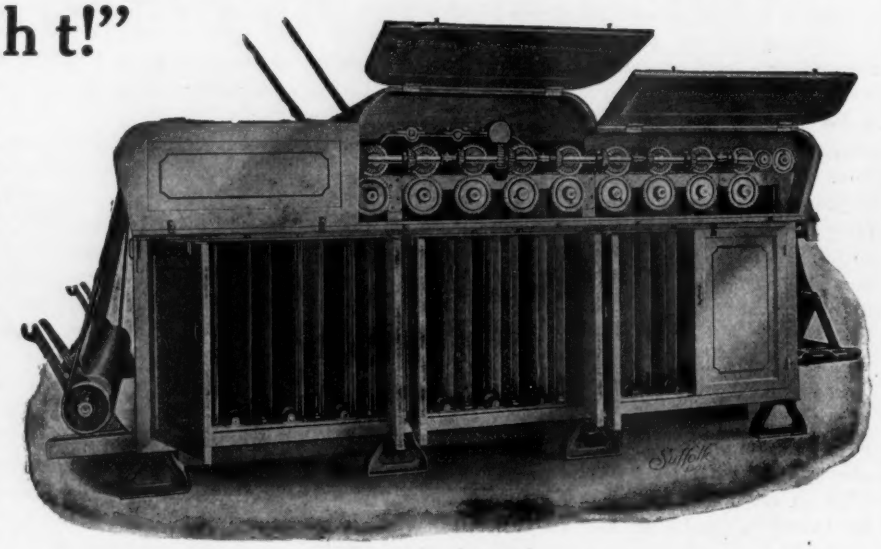

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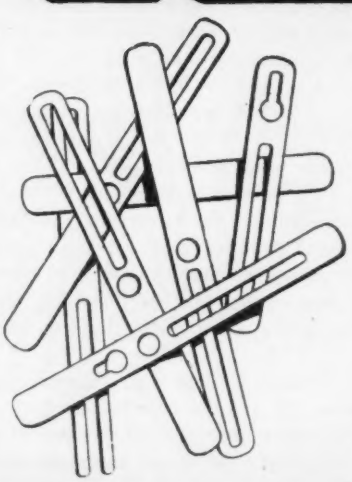

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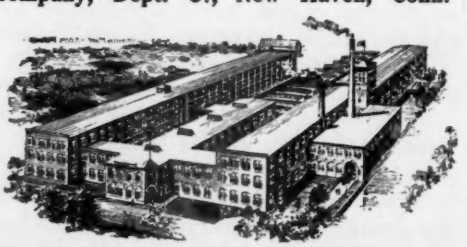

fairness to "K. C.," I would state here that it is not as easy to run without the intermediate pickers. The automatic boxes must be watched and filled every little while so as to keep the same pressure on the lifting apron as even as possible. The breaker lap should not weigh over 13 ounces to the yard.

On January 19, 1922, I visited a mill where the new superintendent had made a change from three processes of picking to two processes, and he said it was a great benefit to the mill. This man is a close friend of mine, and I can give his address to prove every statement I make. Could anything be fairer?

I have been a contributor to COTTON for many years, and from my first article I have pointed out the benefits of a short or long draft and at the same time have given my reasons. I have always advocated a light sheet of lap, and on this point I know I am dead right. With a heavy lap or sliver, it must be drawn so many inches, and we all should know that drawing the fibers from one another is termed a severe treatment under the best of conditions. Therefore, the more a carder draws his stock, no matter where, the more he takes the life out of the stock. Furthermore, it should be seen that more foreign matter can be extracted from a light sheet than from a heavy one.

Here's a question I want the heavy lap, long draft boys to answer for me: What takes place in the card when the draft is increased from 100 to 150 inches, and why not get the full benefit by making it 200 inches?

Wash (Mass.)

Raw Stock and Long Chain Dyeing.

EDITOR COTTON:

I read something about beam and package dyeing in the February issue, by "J. H. K. (Ga.)." In my opinion, either or both of these systems of dyeing may be cheaper and also the goods manufactured with them. But, can "J. H. K.," or anyone else, produce the pretty heather mixtures that are seen today from anything but raw stock? Or dye synthetic indigos in a package machine that can half-way compare with a chain dyed denim? Or make a piece of ginghams with from four to eight colors or shades and over 80 picks per inch; also solid shades of the same construction? These look like silk, and are made at such mills as the Lorraine and Parkhill, and all are dyed in the long chain.

Then "J. H. K." overlooks a few other points that must be taken into consideration. First, that in the construction of a regular 2.40 yard denim, the warp is solid blue, just about the half tone of a white filling denim, which warp is also solid, very deep in shade. Now the light shade or 2.40 has a filling made up of two single rovings, one black, the other white (grey), which is known to the trade as mock filling and D & T. How are we going to get this from a package dyeing process?

Again, "J. H. K." states that everyone knows that untreated stock runs better through the mill than dyed cotton. But all manufacturers do not believe such to be the case for there are many mills that do nothing else for the trade but spin yarns from dyed raw stock, and they seem to have about as pleasant a time in the processing as some mills doing only ordinary white stock. Yes, in raw stock dyeing there are some lots left over, and there is the colored waste to be taken care of, but "J. H. K." would lead you to believe that in tube dyeing, everything is easy sailing and all is well when the yarn comes out on a dyed and dried tube. Now if this yarn is to go into a warp or a set of beams to be slashed, first it has to be placed in the warper creel—the number of ends, according to the construction, may be 400 or 450, probably five beams, to be made for the set. After the creel of tubes is run down to small pieces, what would "J. H. K." do to continue the completion of the five beams? I would refill the creel, take the pieces out and rewind onto full tubes, and at the finish of the set would still have a set of pieces and probably some full tubes left. If anyone can make a calculation to dye so many pounds of yarn on tubes of skeins and then warp this into so many beams in a set, and have no yarn left over, I would be much pleased to hear from him.

Of course, if the yarn dyed in package form on cones is for knitting purposes or twine or something else that is shipped out in the original package, that's all right, but to say there is no left-over won't do. As a rule, we have left-overs from nearly all skein dyeing or raw stock dyeing if these are to be warped or beamed.

"J. H. K." says also that the spinning of ordinary white (grey) cotton is more flexible or that several numbers may be spun from the same mix or stock. Also this same thing applies with colored cotton. At this time we are making 8s to 18s from the same dyeings.

Going back to that left-over proposition, will say that in our line we try to do as much dyeing in the long chain as possible, just for the very reason that everything is used up when dyed in that form, whether it may be for warps, filling, tubes, cones or polishing (glazing).

There is no doubt but that the beam or package systems have advantages over the other older methods when one thinks in terms of tonnage, but production in quantity does not sell goods. I have looked at a lot of beam-dyed coarse chambrays, pinks, blues and other shades, and the best that I could say for them is that they all looked kind of streaky, not at all to compare with those dyed in the warp. A certain class of people will buy anything that looks good to them.

As there are several systems or methods in dye plants, so are there vast differences in the management of same. For instance, in some mills the yarn goes to the dye house from the warpers in a set, all in good shape, and comes back to the beaming department, some in each set torn up in bad shape—once in a while, through accident, but in most cases from carelessness and poor training of the help. Then again, the up-to-date managed dye house (and they are in the majority) are careful in the handling of the work and deliver the warps to the beamer in just about as perfect shape as received. Now when these are beamed and slashed properly, I see no reason why they will not weave as good as any of the new systems of dyed warps.

The claim is also made that loom production is better or more for beam dyed warps. I would like to ask if this assertion is made from actual test. I doubt it. The only way to prove these things is to have sets from the various methods tried out at one first-class mill, making sets of something worth while, say about 40s warp, solid color, and white filling about 76 or 80 picks per inch, about 6,000 yards in each set. When ready these should be put into automatic looms. Then the conditions are right for a true test as to production and quality.

One prominent disadvantage in package dyeing, ac-

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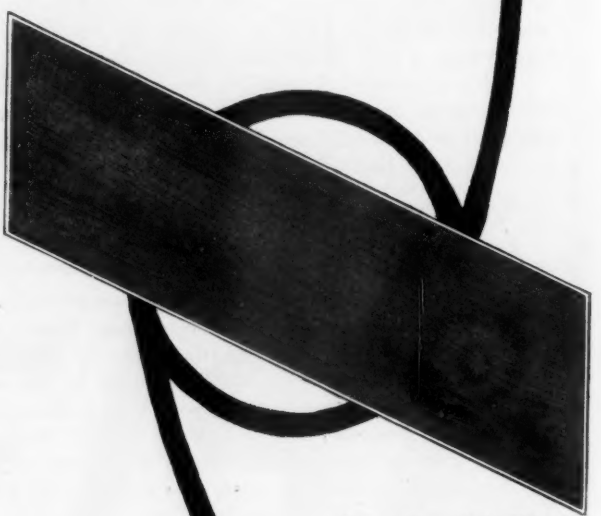

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cording to "J. H. K." is that the water must be pure, which in some places is hard to get. So also are straight dyes scarce. So in warp dyeing and stock dyeing, where water is fairly good, and where a fair-sized stock of dyes are kept, a man who knows the art from experience can go right along making his own shade from combinations of the stuff he has on hand—if he happens to be out of something direct.

But for all kinds of dyeing and bleaching, both the water and dyestuffs cannot be any too pure. I do not believe I am far wrong when I state that probably 20 per cent of the colored cotton yarns dyed in this country go into goods that the ordinary mill man would not think of, such as the fine ply yarns to braid on wire (electric), whip handles, shoe laces, shopping bags, gloves and many other kinds of goods, and nearly all of these have special processing after being dyed. This is not including the thread industry, which is a unit in itself.

Then there is the twine business, both unfinished and glazed, where lots of dyeing is done; also the braided cordage line, solid colors. In the latter two, some of the coloring is done in the finishing. And there is one more, the combination indigo dyeing and slashing machine, put into operation last year at a mill in North Carolina. This, in my opinion, is one of the most successful new arrangements for doing good level indigo dyeing, straight through from the section beams to the loom beams in one continuous run, that has been tried out so far.

There are so many angles in the dyeing industry that it is hardly possible that any one man would be able to tell us just what would constitute the best way to do a certain thing. Several men will do a job, all in a little different way, and the results will all be good just the same. What is needed most at the present time is for the practical men, the men who work and think as they go about their work, to get new ideas into their heads, and as soon as some idea of a better way strikes them, jot it down and at the first opportunity, try it out. If it is not as good as was expected, don't give up; keep on trying. That is just what those before us did and that is what brought us to where we are today. All the improvements in textiles and machinery have not been completed yet, and I believe that before 1922 goes out, we will see something wonderful in the construction and operation of some of our mill machinery.

Mack (Ga.)

Traverse Grinders.

Editor Cotton:

This is in reply to the question in the February number by "H. E. S." asking information regarding the construction of a cotton card traverse roll.

The shell or outside of a traverse grinder is mounted on the worm by means of two bushings which are securely screwed into the shell at each end. In examining these bushings we find one has a step drilled into it to a depth of one inch, with a diameter of 7/8 of an inch. One end of the worm rests in this step. The other bushing is secured to the shell in the same manner, but differs in that it has a 7/8-inch hole right through, allowing the end part of the worm to extend through it so that the driving pulley can be placed thereon.

The pulley on the shell or grinder proper is seven inches in diameter by 3½ inches wide, and is covered with emery fillet. The grinder is made to rotate by a pulley being placed on the solid end of the shell. The pulley on the worm shaft causes the worm to rotate, thereby imparting a traverse motion to the wheel on account of a small pin with yoke attached which fits into the roll and extends through the slot in the shell and enters the thread in the worm.

W. M. (Conn.)

Maintaining the Operative Force.

Editor Cotton:

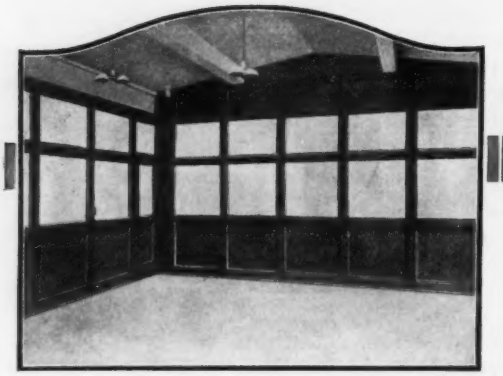
I must agree with "Contributor No. 96" in the discussion pro and con regarding an employment manager, which was brought out in the January number in a letter from him and another letter signed "A. L. M. (Mass.)," the former being opposed to the employment manager and the latter expressing his favor for such a position.

In the first paragraph of his letter, "A. L. M." says, "The duties of an employment manager are to secure and maintain an adequate working force." But is this not a case of the law of supply and demand? I should very much like to have "A. L. M." tell me just how an employment manager can maintain a working force. He may be able to secure a working force (if there are enough floaters seeking work), but to maintain it is a matter of attraction of either the job or the overseer. "A. L. M." must have also had experience with employment managers.

Now let's see how this employment manager proposition works. The employment manager is neatly dressed (Why not? He has no work to do.) and is generally busy when the help is shifted or when the mill is started. The person seeking work is first questioned, and if there is nothing doing in his or her line, the person is told so. Exit. On the other hand, should there be no position open but a change expected, the person in line for such a position is given a ticket known as a pass. This is a sure sign of employment.

When the position is open the person is told to go to a certain department and hand the ticket to the overseer. After working a few weeks, nine times out of ten this same hand will approach the overseer something like this, "Say! Ain't it about time I was promoted?" The boss may or may not look surprised, depending on the condition of his nerves, but his answer is that promotion is the fartherest thing from his mind. Then he is told by the worker that he was promised promotion by the employment manager—and the fun begins. This it is that causes the friction. The employment manager is continually after a working force, and if help is not plentiful he will make all kinds of promises to land the prospect. What does he care for the hardships his selections may cause the overseer?

Once, while I was working as carder in a Massachusetts mill, an eighteen-year-old boy handed me a ticket reading. "Doffer on fly frames." Being short of doffers, I put the boy to work. In a short time a few speeder tenders came to me saying that this boy knew absolutely nothing about doffing. I went to the boy and asked him, "Did you tell the employment manager you could doff?" He replied, "No sir, I simply asked for work." I told the superintendent the whole story, and, throwing up his hands, he answered, "For goodness sake, don't have any friction with



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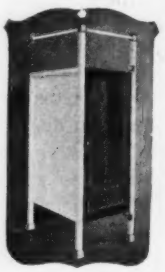

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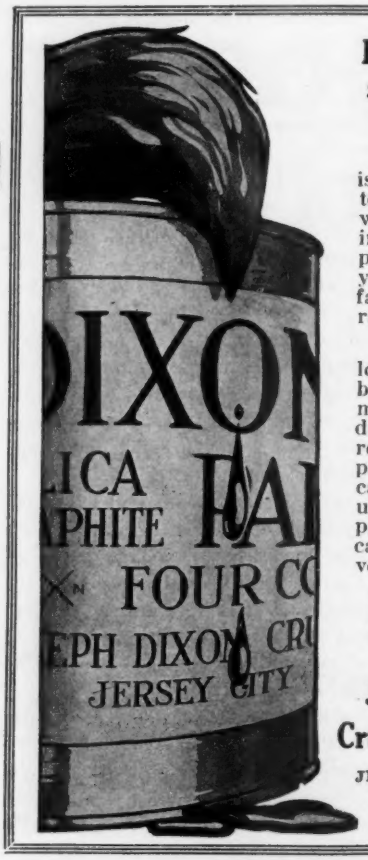

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the office. Do the best you can." I did. I accepted the first position offered me at another mill.

If the superintendent and overseers know their business, the work runs well and there is no need for an employment manager to almost kidnap help. On the other hand, if the overseers do not understand their business and the work runs badly, the employment manager and all the other officials of the mill are unable to maintain an efficient working force. Help is always looking for something soft; spoiled during the war, and for one I am thankful that they either had to change their ways or be out of a job. "A. L. M." speaks about the war period, but let me point out something he didn't mention.

When we had trouble in those dark days there was no regard for employment managers or arbitration. "Oh, no," they said, "We are going to take advantage of every opportunity, and we are going to strangle you into a position where you dare not resist our demands."

If there is harmony between the employment office and the mill, it is where the employment manager minds his own business and does not interfere. And if he does this, how is he going to maintain a working force? In case of a help shortage, how can an employment manager secure help any better than any overseer? Overseers are in contact with help always, while the employment manager is in contact with floaters always. That should be kept in mind. Paragraph four of the letter from "Contributor No. 96" in the January number is worth reading again.

At this writing we have great numbers out of work. What are the duties of an employment manager at the present time? In all cotton mills the entries are full of help seeking work. An analysis of the conditions will show that the overseer is the required force.

And I just had to smile when I read "A. L. M.'s" second paragraph. Here he would cast human nature to the four winds. Employees are not articles of commerce to be bargained for as so many pieces of machinery. I was superintendent for years and knew very little about the game of buying but I was commended many times by the treasurer for my judgment. It was easy, too. Here's the way I went at it: Suppose I was in need of building material, I would take, for example, the January issue of Cotton, on the cover page of which we find "Buyer's Index, Page 284." Turning to page 284, I find twelve concerns to do business with for material of this character, and for twenty-four cents I can get the ruling price from each. It is easy to purchase materials, but not help, and herein lies the fallacy of "A. L. M.'s" statement.

In the fifth paragraph, "A. L. M." paints a beautiful picture which may be characterized as follows: If you are lucky enough to be overseer where they have an employment manager, and you discover that your neighbor has a better working force, all you have to do is "kick," and the employment manager will get you a working force superior to that of your neighbor.

That's easy, too—on paper. But if it were true practically, what an enormous salary the employment manager could command!

Who, then, should a mill manager select for his employment manager, if he decides he wants one? My answer is: an old mill man who has had a bit of experience in every department. However, in my honest judgment, an employment manager is about as much help to a mill as a yarn breaking machine is to the production of uniform, strong yarn.

Wash (Mass.)

An Overseer on Employment.

Editor Cotton:

In the January issue, "A. L. M. (Mass.)" says the duties of an employment manager are to secure and maintain an adequate working force. Right! But do they always do this? No! Why? Well, from my experience I should say it is because of insufficient training and a lack of experience in the different departments in the mill.

He then says that the employment manager must be a man who can and will devote his time to solving the problems of keeping the worker on the job. Keeping the worker on the job will not always produce satisfactory results, however; it may do so for the employment manager, but not for the firm and the overseers. If an overseer is contented with his help, all the employment managers in the world would never help the firm with all their problems.

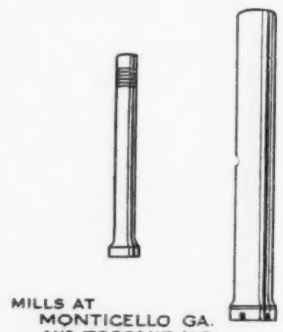
An employment manager cannot keep an unskilled hand in the mill without hurting the firm. Let us say, for instance, that a weaver is wanted. The overseer notifies the employment office of his wants, and soon in comes a husky fellow who says he can weave; he is hired and sent to the overseer, who tells the second hand to put him to work. In about two hours here comes the second hand back to the overseer with the report that as a weaver, the new man is certainly a good coal-heaver. The overseer goes over to where this worker is, and keeps an eye on him for a short time, and soon finds out that the position for which this man is best suited is handling warps or trucking in the mill yard.

What's the result? Another "black eye" for the employment manager. This man either has to be changed to some position for which he is suited, or else he must be discharged. Now, who gets the best deal, the mill or the man? The man has a chance for another job, while the mill must wait for some other worker to come along—and then take another chance.

On the other hand, if the overseer had been doing the hiring in this case, he would have started the loom and put the man to a test before giving him a job. That's something the employment manager probably couldn't do; even if he had the loom handy the chances are he probably would not know the first thing about it.

"A. L. M." also mentions different sports activities among the duties of the employment manager, and that is where the manager fits in and the mill is again the loser. I have worked in mills that had employment managers, and when it came to sports, Mr. Manager was right out there in the field, playing ball and smoking cigars, all on the mill's time. Also, 20 or 30 would-be ball players were getting a "try-out." This was two hours every other afternoon, much to the delight of the would-be players. They were getting paid while enjoying the pastime. Pretty soft, I say. Furthermore, the hours taken for this practice were from two to four in the afternoon, which I consider the best working period of the day.

Wonder how a stockholder in a mill would feel if he should chance to walk along the mill grounds and see a small army of men playing ball—or trying to play ball—wouldn't there be something humming at the next stock-



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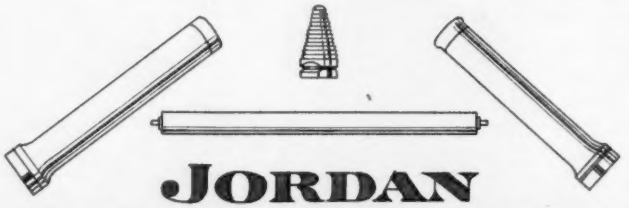

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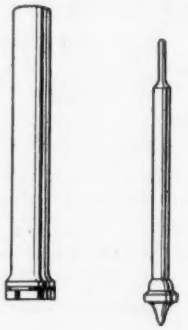

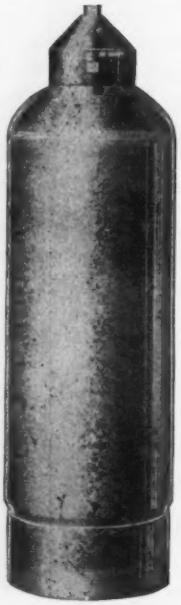

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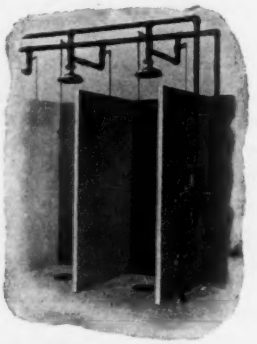

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holders' meeting? Not that it isn't a good idea to have some recreational facilities for the workers, but if the employment manager was working for the firm's interest and not for the sake of having his name in the newspapers (such and such a mill is starting a baseball team and Employment Manager So-and-So is captain), he could go out and get a team of grammar school boys, then pick out nine of his men at 5 o'clock and play until 6. I am sure he would get better results and better players, and above all, the mill would not lose time, and the machinery would not stand idle waiting for the players to come back at 4 o'clock.

Then again, if there happened to be some good ball player such as a pitcher, one that wins a great number of games, at another mill or in town, I have seen employment managers who would be out looking for this certain ball player and offering him some soft position at a good salary just for the sake of getting him on the payroll. Then he would have to show his face at the office once or twice during the morning and then go out playing ball in the afternoons. That's what he'd be forced to do in order to draw his "hard-earned" salary! Hard luck!

In regard to housing facilities, "A. L. M." has the right idea, but will the employment manager trouble himself to see that the snow is kept off the walks around the houses, will he take an interest and promote gardening among the help, will he go and visit the sick employees? This is of more importance than the ball team and other sports "A. L. M." writes about. If the employment manager will pick one of his best ball players and put him in charge of the ball team, then take an interest in the working class at the mill, encourage them to plant gardens, grow vegetables for the table, build a nursery for their children, make them understand that they are a part of the mill, that without skilled labor the operation of the machines is an impossibility; if he will do these things, the help will be contented and the employement manager will be earning his money and not sponging on the firm. Furthermore, the vegetables produced from the gardens and the care given the children, and a visit from the nurse to the sick every morning, will be worth more than all the championships the ball team can win.

In regard to what "A. L. M." says about keeping the help in the mill, it is my experience that a good, respectable overseer, who knows his position and understands human nature, is one of the most valuable assets a mill can have. On the other hand, a mean overseer will keep the best class of help away from the mill, and no ordinary influence can overcome the feeling set up in the minds of the workers by such a man. How often will this remark be heard around the village, "Gee, I hate So-and-So. He's a slave driver, and swears at the help when things go against him." No set of help is going to be contented when a man like that is in charge, no matter what other conditions be made as nearly ideal as possible.

Now we come to the matter of records, and frankly this is the only feature, to my mind, where the employment office does the firm any good. And then one bookkeeper with plenty of pep could take care of all that and save the firm from having an employment office full of girl bookkeepers that amuse the manager when he feels blue, as I have seen in some mills.

Nine times out of ten it is always the poorer class of help that changes from mill to mill, the higher class are contented and never think of leaving.

Now, supposing a man should come back to a mill and apply for a position. Sure, look up the records. That sounds reasonable and a good system. But records can sometimes lie, and if they are always taken at their face value, an overseer who has it in for a certain man can blacken this man's record so that it would look like he was a criminal. Then he can never get another job in that mill, because the employment manager must keep that record and put it up to him should he ever seek employment there again. This is where the overseer has a chance to slip the wool over the eyes of the employment manager.

I wonder what "A. L. M." thinks of this record I came across in the employment office of a firm I used to work for: The night boss at this mill had it in for a certain man and one night had cause to discharge him. He filled in the discharge slip and laid it on the desk for the day boss, and here's what he wrote on the slip:

1. Reason for discharge. Back talk.
2. Would you employ again? Yes.
3. Would you consent to employment in another part of mill? No.
4. Why? Good worker.

Here was a man discharged for back talking. Is there a law to prevent the help from talking back to an overseer, if they want to explain things or defend themselves?

Then the night boss was willing to employ this same man again, which only goes to prove that he had something in for him. And then, he would not consent to this man working in another part of the mill, which means that this night boss wanted this man for his department only and nowhere else, in other words, "Work for me or keep away from the plant."

It was perhaps a good thing that the squirrels slept while this night boss worked, or he might have been among those missing some morning.

Then he winds up by letting the employment manager know that this man is a good worker.

I for one never would take help that was sent in by the employment office. I would go there myself, pick a man or woman I thought was what I wanted, take them to my department, break off three to five ends, and have them piece-up. If they passed the test I would send them back with the second hand and register them in the office. If not, they went back home, and at no loss to the mill or any waste of my time. I was always in hot water with the employment office and manager, but my turn-over sheet showed that I hired and fired less people than any of the other overseers.

I hope "A. L. M." will not consider my remarks as "knocks," because I have no desire to hurt anyone's feelings, but I do not favor employment managers—and I have dealt with quite a few—and I am for the interest of the mill, from which I earn my bread and butter. I do not say there are no good features in an employment office, because there are, manifestly. But what I don't approve of, and what I am arguing against, is the use that is made of the position and authority by a large percentage of so-called employment managers. Perhaps the proposition, taken up by a man with sufficient experience, conscientious and anxious to serve his mill, can be made into something efficient and helpful, but from all I have seen in my experi-

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ence, the average employment manager can be pictured as a fellow in a nice, comfortable office, surrounded by pretty women clerks, smoking his pipe or high-grade cigar, watching the hours fly by and thinking how to spend his large salary.

It is just such abuse of the position that I believe is responsible for a considerable portion of the failures of the employment office system. I believe, if employment offices are to continue, these practices should be eliminated; otherwise, I believe it best to do away with the entire system, and pursue the more practical method as I have outlined in this letter. I should be much interested in seeing further discussion on this subject. T. A. B. (Mass.)

National Sulphur Black BG Ex. Conc. is a new dye recently developed by the National Aniline & Chemical Co., Inc. It possesses the greenest cast of any of the National colors of this type and, it is stated, dissolves readily with half the amount of Sodium Sulphide Conc., which makes it adaptable for the dyeing of raw stock, yarns and piece-goods in all types of machines.

Sherman Service, Inc., with offices in leading cities in the United States and Canada, has issued an interesting little booklet on "Economic Production the Great Need, and How to Get it," by John F. Sherman. The book can be read in a few minutes as it contains only a dozen pages. It should be of interest to manufacturers in that it tells the aim and purpose of the service of this organization to industry. The main office is located at 10 State Street, Boston, Mass.

A real boss always acts as if he wasn't.

The Knitting Arts Exhibition.

The annual Knitting Arts Exhibition of the National Association of Hosiery & Underwear Manufacturers will be held in the Commercial Museum, at Philadelphia, during the week of May 22 to 26 inclusive. Information from the office of Chester I. Campbell, 5 Park Square, Boston, who is managing the Show this year, states that work is progressing rapidly on the details of the Exhibition. The entire policy of the National Association of Hosiery & Underwear Manufacturers in handling the Exhibition has been changed this year, and the details in their entirety have been placed in the hands of Mr. Campbell, who is well known in the textile field as manager of the successful bi-ennial International Textile Exposition that is held in Mechanics' Hall, Boston.

Mr. Campbell and other executive leaders in the Exhibition express great confidence in the success of the Show. "Wonderful interest is being shown in this exhibit," states Mr. Campbell, "and while it has been found wise to make decided changes in conditions, arrangement of space, equipment and adjustment of prices, yet I have found the hearty cooperation so essential to the success of an exhibition of this character. The mere fact of getting exhibits is not enough. It is just as necessary to get the purchasing trade to attend. In other words, to make it a 'business-getting show,' and that's just what we intend to do with it. We are after new business for our exhibitors and thus make the show something really worth while. I feel sure the results will be found to justify my optimism."

The regular annual convention of the National Association of Hosiery & Underwear Manufacturers will be held in Philadelphia during Show Week.

The New England Mill Situation.

(*Continued from page* 415.)

but the whole situation is so complicated that it is hard to say what the immediate moves may be.

In so far as market conditions affect the situation, the general feeling is that only a small measure of improvement in demand can be looked for until there is a decided uplift in the retail demand for merchandise. Dry goods retailers in many sections are in none too good credit because of inability to maintain their sales in territories where customers are out of work or have been affected by the great reductions in the prices of farm products.

The jobbers are buying very conservatively and prices have shown a tendency to go down in the face of less output and higher costs. Some mill men feel that the jobbers now begin to discount a new, and what they hope may be a lower priced cotton crop. The cotton manufacturers will certainly buy no cotton in advance of their needs unless another crop failure comes into sight. The farmer may feel better because of the rising prices of grains and other things he sells, but he will have no large increase of buying power until after the next harvests. In the meantime, strikes may increase rather than decrease in industrial centers.

Cotton Comment.

BY H. AND B. BEER.

New Orleans, March 18th, 1922.

During the past month the market ruled comparatively steady, fluctuations being confined within a narrow range, as a result values show little change compared with one month ago.

The apathy of the market, due to dullness of trade, was attributed also to the limited demand being offset by limited offerings, offerings being equal to the demand only.

Strange as it may appear the strike in the textile mills in New England has been without effect on values, probably owing to the belief that differences will be adjusted satisfactorily in the near future when it is thought the walkout will come to an end, permitting idle mills to resume operations.

Notwithstanding the labor troubles in New England, census returns for month of February showed that American mills consumed 512,000 bales vs. 433,000 last year, including 39,000 bales of linters against 38,000 last year, making the total consumption in the United States for the first seven months of the season 3,827,000 bales vs. 3,008,000 one year ago.

Census Comparatives.

On February 28.	This year.	Last year.
Mill stocks, U. S.	1,596,582	1,327,155
Stocks in public storage in U. S.	4,221,830	5,503,139
Total stock in U. S.	5,818,412	6,830,294
Active spindles in U. S.	33,797,329	32,496,856

Thus far this season the South has marketed 8,525,000 bales vs. 8,681,000 last year, exports to Europe have been 4,012,000 against 3,580,000, and spinners takings of American cotton by the world total 9,047,000 vs. 7,151,000. Compared with one year ago the world's visible supply of all kinds is 5,471,000 vs. 6,410,000, of which 3,485,000 is American vs. 4,284,000 last year.

World's Visible Supply of American Cotton, February 28th.

Bales	This year.	Last year.
Liverpool stock	538,000	635,000
Manchester stock	50,000	81,000
Continental stock	527,000	487,000
Afloat for Europe	309,000	290,000
U. S. port stocks	1,039,000	1,387,000
Interior stocks, 30 towns	1,022,000	1,404,000
Total	3,485,000	4,284,000

While it is likely there will be enough cotton to go around, especially at a price, until another crop finds its way to market, the situation is possible of manipulation, particularly if anything serious happens to the new crop.

In connection with new crop prospects will say that the outlook at the moment is not entirely satisfactory, not only because of there having been too much rain in the Mississippi Valley states and the South Atlantic section, but owing to low temperatures and the want of rain in West Texas.

Official data at hand indicates that a small quantity of fertilizer will be used again this year, as was the case last year, sales for seven months ending with the close of February amounting to only 552,336 tons in the cotton belt vs. 658,726 tons last year and 1,858,777 year before last.

While the general impression is that the acreage will be increased about 10 per cent this year, there is no assurance of this estimate being realized, as returns to the National Ginners' Association point to an increase of only one per cent, which idea, however, may be raised later on.

According to official record a larger number of weevils hibernated the past winter by five to one, and it is hoped that the recent freezing weather to the Gulf coast destroyed many, but this is doubtful owing to the task of exterminating the pest in the past. In the large number of weevil reported as having survived the winter lies the danger to the new crop, especially if the crop is late in making a start. An early start, which all hoped for, has been made impossible by too much rain and cold weather.

The Knit Goods Market.

(*Continued from page* 463.)

executive, "and are running at a loss. Of course we can sell a few goods in some fashion and thus pay the bank out of stock, whereas if we were idle we still would have raw materials and no money coming in to meet obligations. With us it is loss whether we operate or close down, so I guess it is all right to go ahead until we clean up."

Spring underwear is decidedly spotty in the primary market, a few mills booking duplicate business. Winter underwear is less spotty, very few mills escaping the effect of jobber resistance to prices.

Probably not one-half of the Spring underwear for the current season has been bought by jobbers. There has been manifest a determination to not pay the increases made necessary by higher yarn prices. Those who do pay the advances have sold to the extent of their initial orders, and some are believed to have sold beyond their commitments. In the main, manufacturers are holding for the advances, taking the position that distributors will buy when forced to do so, even at higher prices than now are asked. If much of the underwear for Spring and Summer re-

mains to be bought, manufacturers can better afford to wait a few weeks longer for goods to move than sell at prices which buyers are offering. At this writing an Eastern mill with a large output of men's bal briggan shirts and drawers is being operated only three days a week. Idleness of such machinery at the threshold of Spring, with underwear stocks low in wholesale and retail establishments, indicates the stagnation generally in light weights for men.

A New York State mill also making bal briggans is sold to the middle of May and has rejected orders calling for deliveries this side of that date. The situation in the two mills referred to illustrates the spottiness in light weight underwear.

Light weights for women have been moving in better volume recently. The activity is centered in cheap drawers and vests, for which a Pennsylvania mill about the middle of March booked an order for 50,000 dozens, covering at once for cotton yarns, in a purchase of 20,000 pounds.

A New York commission house could sell more cheap light weight underwear if the mills which it represents could make deliveries in April and May. The same establishment is in need of women's cheap union suits.

A direct-to-retailer underwear mill has sold to date more dozens for the current season than were sold for the whole of the season of 1921. It has added a number of new accounts and has taken about 2,000 more orders than last year. Retailer mills are profiting by the failure of jobbers to keep their stocks in order. The effect of such a policy is shown in a recent trade letter of the John V. Farwell Company, which said:

> A careful ana'ysis of retail conditions shows that buyers who have kept their stocks in good condition to serve their trade and have used all efforts necessary to keep up activity have enjoyed a much better business than those merchants who have let their stocks fall too low. From these active sources there has come a quickened demand for seasonable lines for immediate delivery.

Jobbers who neglect their stocks while bucking the market doubtless are suffering in proportion as the Farwell letter indicates the retailers have suffered. Their attitude is attributed by them to price, a matter which manufacturers cannot remedy, for they now, as a class, are operating at a loss. Each of 28 manufacturers recently assembled in conference admitted that last year he operated at a deficit and was headed that way this year. With some of them, running the mill on such a basis is going to terminate very soon, depending on how long their bank accounts will hold out.

Some of the price objections are ridiculous. For illustration, a 17-pound fleeced union suit priced $10 a dozen is rated too high by jobbers because it was advanced 50 cents a dozen over last year's price. Another mill is selling a competitive suit at $9.50, the price of a year ago, but jobbers are not taking of that suit as though they felt the prices were right. Their aversion to putting goods in stock even under exceptionally advantageous circumstances is shown in the refusal of a jobber to accept a shipment of firsts of low end union suits invoiced to him at the price of seconds. As a matter of fact, he bought seconds at a time when it was uncertain if the mill would be so unfortunate as to have enough to deliver in January and February. He really did not expect to get them on schedule, and probably was bluffing. The mill evidently needed business and, regarding the order as an attractive one, called his bluff and shipped firsts. Now the jobber, even though called on to pay for seconds, will not accept the firsts, his only excuse, so far as he has expressed it, being that the mill shipped what he did not order—and there was an impression he might be able to win on his defense.

A fair volume of business in women's underwear for Fall has been booked, but contracts for men's have been light, and during March the market was almost at a standstill. Some jobbers were willing to place orders for August and September deliveries, but most mills did not want that kind of business. Unless they could begin shipping in June, at the latest, they preferred to not put goods in process. They had become weary of carrying stocks for dealers. Jobbers who have refused to buy for deliveries beginning earlier than August said they would rather pay more later than carry stock for retailers. At the rate the latter are buying, it would appear they are not disposed to carry goods for the consumer. Manufacturers are the victims of a deadlock somewhere.

A bright dealer from a Central West state who was in New York several weeks ago trying to buy underwear at last year's prices pointed out to a manufacturer that all the blame for the present situation rests with the mills. He said: "If last year, when cotton was 12 cents, you had bought for your requirements for this year you could be selling at prices which the trade would be willing to pay."

Looking at the buyer in amazement, the manufacturer said, "Why don't you go back a few years further and ask me why we did not buy cotton when it was being kicked about at seven cents a pound?"

Sweater manufacturers in the main have been getting very little Fall business lately. The better business is in garments for women. This is explained by the fact that relatively fewer women than men are out of employment and that women haggle less over price when style is under consideration.

The big industrial centers, such as Pittsburgh, Pa., usually are rated the better outlets for men's sweaters. This year the markets in the industrial sections are flatter than for a number of years, due to widespread unemployment. Men's sweaters run to the sports types. With steel mills operating at only 65 per cent capacity, on reduced pay schedules, sports garments are something with which the ordinarily big earners feel they can dispense.

A few mills which have brought out fetching light weight worsted sweater coats for women at unusually attractive prices are booking business, and one is operating three nights a week in addition to single day shifts.

Sweaters, like bathing suits, are costing mills more money than a few months ago, and dealers are balking at the advances which have been put on. It is not infrequent that a good size bathing suit order, offered at last year's price, is withheld because a buyer will not pay 15 per cent more than the opening, notwithstanding the suits have been sold up close and are in demand among resort dealers.

At a recent meeting of the Tompkins Textile Society, which is composed of students at the Textile Department of the North Carolina State College, West Raleigh, N. C., an interesting address was made by S. W. Jen on "Textile Manufacturing in China." Mr. Jen is from Shanghai, having previously graduated from a textile school in that city, and is now taking an advanced textile course at the North Carolina school.

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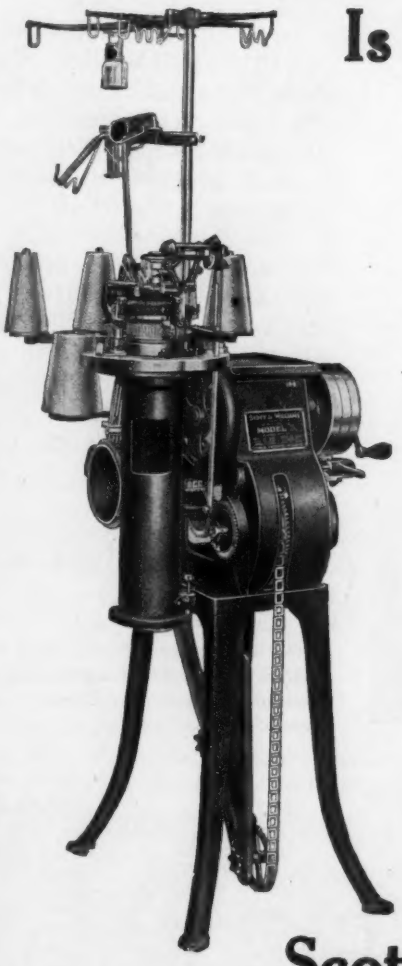

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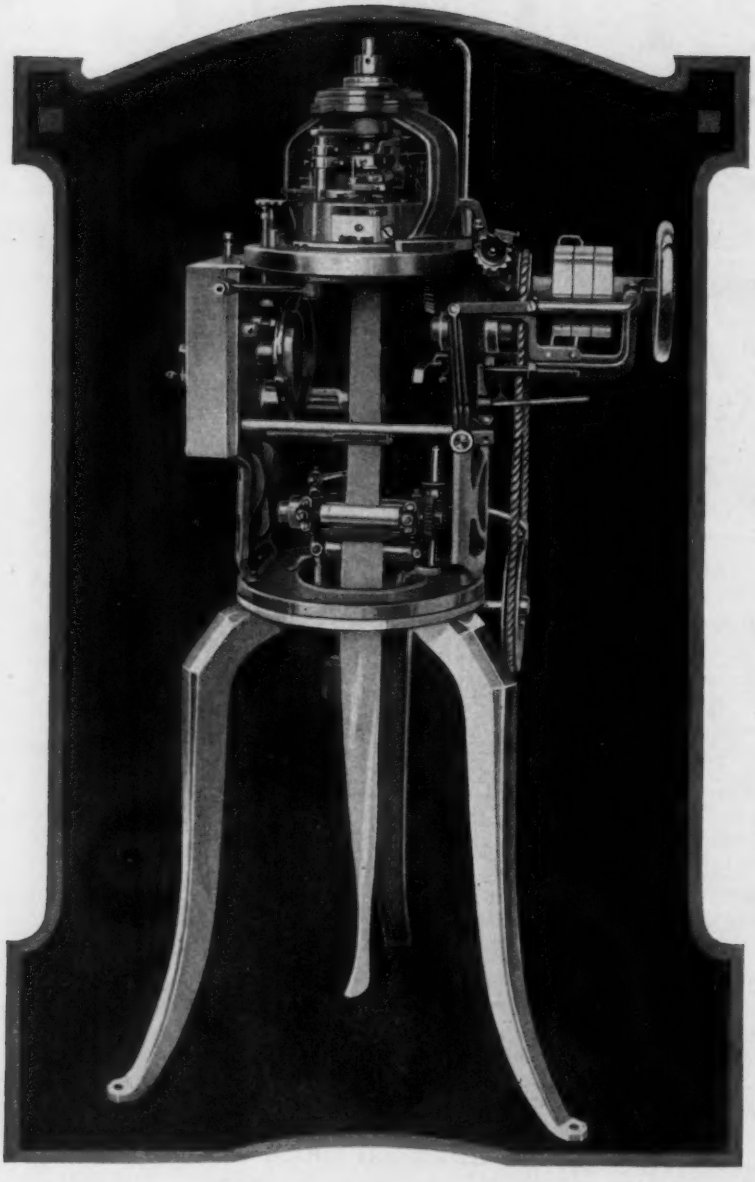

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Developments in Hosiery Manufacture

BY WILLIAM DAVIS, M. A.

All engaged in the knitting industry are watching with very considerable interest developments at present pending in various branches of the manufacture of hosiery, half-hose and stockings. In most of the machines already described in this series, no provision is made for making rib top, leg and foot on one and the same machine in the case of children's socks and no provision for making automatically the welt on ladies' hose. In many types of hose machines, ladies' hose are made on the machine with a double piece for the top which has afterwards to be turned over and seamed to form a double ply of fabric or welt about three inches at the top of the leg which gives a better grip to the limb and also greater strength at the part used largely for pulling the article off and on. The double-ply fabric at the top gives this added strength and also provides a means of finishing off the article by turning what might otherwise be a ragged edge. The writer has just seen some ribbed hosiery which has a most unsatisfactory way of finishing the end in that a row of binding stitching with strong cotton thread, which generally breaks at the first pull on and the article has to be slit down for an inch or so to allow of its being drawn on by the wearer. This system of turning the welt as it is termed in a separate operation on the overlock or linking machine has always been a great hindrance to production for it has involved a new series of machines and a certain number of operatives have to be set apart for this work. In some American models which have been on the market for several years, this difficulty has been successfully overcome and the welt is made and turned automatically on the machine so that when the stocking is produced, all that requires to be done is to make the usual join of the loops across the toe.

The trade are also watching with great interest at the present moment the progress of a new model for making the rib top and the leg on one and the same machine without any latch needles being required for the ribbed portions. This is a step fraught with the most interesting possibilities and it synchronizes with attempts on the part of other inventors to abolish the use of latch needles in knitting machines. Anyone who has made a study of the great difficulties of needle manufacture and has an idea of the large proportion of imperfections in knitted goods which are directly attributable to defective needles, particularly at the delicate portion called the latch, will understand how intensely interesting to the trade this possibility will prove to be.

Side by side with these developments of making hosiery with ribbed tops on one and the same machine, mention should be made of a machine recently devised by a Leicester concern on the same lines, except that latch needles are employed. This firm's products are already used for making ribbed hosiery fully automatic on the machine and which has been described in detail in a former issue of COTTON. The new machine is an adaptation of the same principle, the upper cylinder receiving the double headed needles which make the ribbed portions and the writer has had to do with several of those new machines which are being taken up very largely by manufacturers. The rib top of the sock is made by using the double ended ribber needles working from the upper cylinder, and for the leg these needles are drawn down into the lower cylinder so that all work in the plain stitch for the leg and foot. This is an enormous advantage because the production of those articles in the past has involved the use of a separate rib machine on which the ribbed tops had to be made in long lengths connected to each other by a slack course or courses which could be ravelled out so that the raw stitches could be transferred to the points of the transfer ring and hence to the needles of the machine on which the plain leg and foot are worked. Ribbed tops made in this method have often grave defects, for in transferring the loops, they sometimes do not fit in exactly and spaces and openings occur which often create holes at the join. There is also great difficulty in having the stretching property the same at the join because the universal tendency is for the rib top to be tight at the transferred part and when the wearer is pulling the article on, the stitches burst and holes result. There is also some difficulty in getting the proper kind of rib, with sufficient elasticity, a common fault being that the rib is thin and weak compared with the leg and foot portions. Another point is the unsatisfactory nature of the work done by the rib transfer hands who are of necessity the youngest workers and during their training much defective work is produced.

Keeping these things in mind, it is easy to understand that hosiery manufacturers at the present time are watching these various developments with the keenest interest and as a result of the developments which we have mentioned, there are certain to be new methods devised which will completely alter the present system of manufacture. The writer has seen these Leicester-made machines in operation for a considerable time and is much impressed by the results obtained from them. They are very solidly constructed and give a large production without requiring more than normal attention from the mechanic.

In balancing all these various developments of the trade, the question of the mechanic's wages has to be continually kept in mind in assessing the value of any new improvement, for if the machine with the new attachments is always going wrong, there is an increased number of stoppages and this has to be put down on the debit side of the account. In making improvements it is inevitable that a certain amount of new tackle be added to the frame and if this is very liable to go wrong then a considerable proportion of profit has to be deducted as time for mechanics repairs. For this reason, it seldom pays a manufacturer to install many varieties of machines in his hosiery manufacturing plant and if a new machine is decided upon, it should be installed in sufficient numbers to enable the manufacturer to engage a mechanic for the work and one who will be likely to take an interest in the machines and give them the best possible chance of proving their worth. Many excellent machines are retarded in taking their proper place in the industry on account of the opposition of the factory mechanics who dislike having to master new types in addition to those on which they have had most experience, and the manufacturer who wishes to assess the value of a new improvement must be on his guard against

a kind of conspiracy on the part of the foremen, mechanics or workers to make them work inefficiently during their period of probation.

Considerable interest also attaches to the new hose machine for making the instep or sole of the foot in a material different to the leg and this is an improvement fraught with most interesting possibilities. It is specially welcome for the expensive hose trade such as the real and artificial silk branches where under present conditions, the silk material has to be introduced into the foot, upper and lower. The only means of strengthening the wearing properties of the foot where the bulk of wear and strain occurs is to introduce extra yarns of wool or cotton in the form of splicing in addition to the silk of the ground. This is not entirely satisfactory because of the stiffness and also the silk is present as a luxury material high in price which is wasted in its effect on the instep of a half hose where it is never seen and does not give much increased wear, besides being of doubtful heat-retaining property in relation to its price. By the new split-foot hose machine, devised by another American maker, it is possible to have the high-spliced heel, the under part of the foot, heel and toe in one and the same yarn, whilst the silk can appear in all the other portions of the article, including the upper part of the foot. This is effected by the machine's being given a reciprocating motion from the high spliced heel right down to the completion of the toe. In making the heel and toe the extra pockets are produced in the ordinary way by having the thicker yarn inserted on the front half of the needles only, but when the foot proper is being worked two thread guides are in operation, one working the silk yarn on the back half of the needles and the other working the woolen or thicker cotton yarn on the front half of the needles. In this way, the upper foot is worked in silk the same as the leg, whilst the lower part of the foot is worked in wool or cotton in thicker counts to give extra warmth and wearing power the same as the heel and toe.

One disadvantage occurs which must be taken into account in estimating production and that is the loss of speed which results from working the reciprocating motion right along the foot, but against this must be placed the considerable saving of expensive yarn ordinarily inserted along the bottom of the foot where it is not required and there is also a considerable increase in the wearing property of the article. One peculiar point is noticeable in the articles produced on this machine which is that the lower foot or instep portion appears to be larger in dimension than the upper part of the foot. This is due to the fact that the instep is worked in a thicker yarn which throws the fabric out to width as compared with the thinner silk yarn worked on the upper foot. This gives the article a certain appearance of lop-sidedness at first sight. One point which has been satisfactorily overcome is the joining of the two threads in the hose, they both are laid over the same needle just where the join is affected so that strength is secured by the double thread at the join.

Another point which is a secondary one, but which nevertheless carries some weight is the fact that this joining of the two threads takes place along each side of the foot after the manner of a seam as produced by making hose feet on the English system on Cotton's Patent frames. The markings along each side of the foot give the impression to the casual buyer that they are full-fashioned.

This series of articles on hose machinery would not be complete without mention in detail of a certain model brought out by an American firm which has established itself as a favorite wherever it has been introduced. Compared with the older hose machines this style impresses one with its lightness of construction and compactness of parts. It embodies the principle of the moving needle cylinder, whilst the stitch cams and the thread guides are stationary. The stationary thread is an advantage because in this way a considerable amount of friction and ballooning is avoided as compared with the spectacle of the moving yarn package which is not very edifying. In perfecting the moving needle cylinder they have obtained a considerably higher speed in the machine and also more ideal knitting conditions all round. This machine is remarkable for the compactness with which the levers which control the yarns, etc., are concentrated around the drum whilst the pattern chain is single as compared with double chains employed on some types of hose machines.

On looking inside the cam box one sees that the needles are of the ordinary latched variety suitably strengthened so as to give a maximum of wear in the machine and these needles are assisted in their loop formation by the sinkers or web holders which work between each needle space. This enables the yarn to be introduced into the machine without running on at any time, or after one article has been completed and no trouble is experienced, for as soon as the thread is fed into the needles, it passes under the throats of the sinkers or web holders and the knitting commences forthwith. Seeing that the needles revolve, the work revolves along with it, and when articles are made in long continuous strings, the twist on the string often becomes serious if the machine worker does not happen to be on the lookout. In this machine each article is pressed-off when finished and drops down the inside of the machine so that all that swings is one hose at a time and this is free to do so in the long tube without any obstruction. This also obviates the labor of cutting them at the feet and laboriously unravelling the slack courses of welt yarn.

We are indebted to the manufacturers for the cam layouts shown herewith in Fig. 1 and consideration of the main features of the cam box will show the advances which have been made in cam construction on this model. In some types of hose machines already described, we have to rely on such things as spring cams and sliding cams to perform the reciprocal knitting operation. The very term spring cam or sliding cam suggests indefiniteness, because as this sliding takes place continuously during the lifetime of a machine, it stands to reason that it will meet with frequent obstructions in its path which will vitiate the knitting operation. Also the spring cams will be efficient only so long as the springs retain their potency. In Fig. 1 the block cam is marked BC whilst on the left of this is shown the first stitch cam SC1 and on the right the second stitch cam SC2. Between those two cams will be noted a guard cam GC. The needles will be recognized as N traveling in the paths of the cams in ordinary knitting, whilst the upthrow cam on the left is marked UTC1 and the corresponding cam on the right by UTC2 adjoining which is the cam K which is continued right round the machine at the height shown so as to keep the needles at their normal level during their non-knitting. For the normal knitting action, the needles are seen to be traveling towards the right and on leaving the normal height on the left at once slide on to the raised part of the left-hand stitch cams SC1,

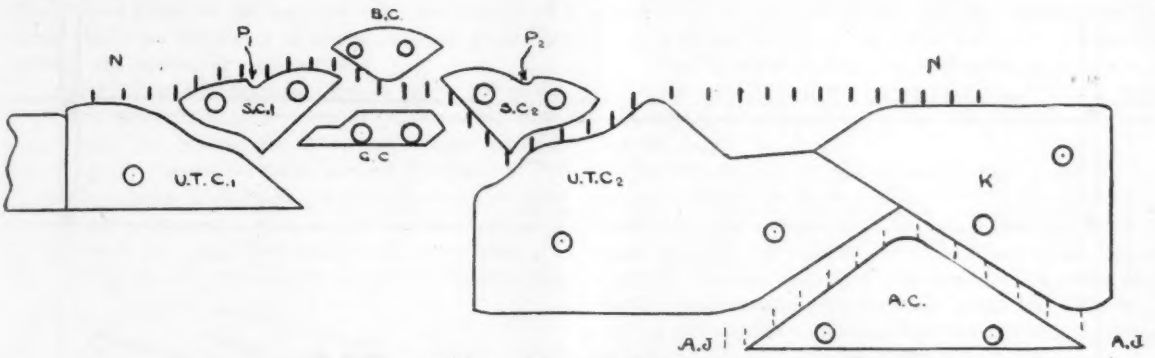


Fig. 1. The Cam Layout.

being raised gradually higher by easy stages so that the needle may receive its supply of yarn from the thread guide. As soon as this has been effected, the needle butt comes against the left side of central block cam BC and is drawn downward to such a position as will enable it to be caught by the inside of the stitch cam SC2 which draws the needle down to its deepest point so that the stitches are knocked over the needle ends and completed. When this is done the needle butts next come against the side of the upthrow cam UTC2 which replaces the needles at the normal knitting level until they are due to be acted upon again by the stitch cams at the next revolution.

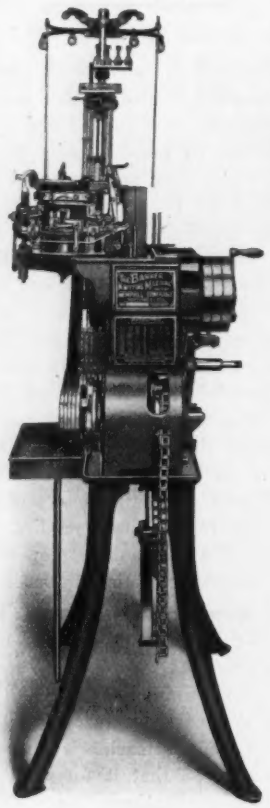
On the heel and toe the motion of the machine is changed from circular to oscillating and the needles then work to right and left alternately so that the cams require to operate knitting in either direction. When the direction of knitting is reversed the needle butts are traveling towards the left at their normal level and are taken up to receive their thread from the guide by the right-hand stitch cam SC2; when they have received their thread they come into contact with the right side of the central block cam BC which draws the needle butts down into line of the left stitch cam SC1 so that the needle draws through the new yarn and completes and knocks over the old loop. When this is done, the butts arrive at the left-hand stitch upthrow cam UTC1 which re-establishes the needles once more at the normal height and knitting level at which they remain until the machine reverses its motion and knits in the contrary direction once more.

The making of the heel and toe is associated with the operation of narrowing and widening to make the pocket portions required and this operation is performed on this machine with great precision and ease. The pickers are simply constructed fingers with a groove at their ends to fit exactly over one needle butt of the machine and when a needle butt is caught, the motion of the needle causes the picker to swing up thus bringing the butt over the upper curved portion of the central block cam BC which raises the butt into what is known as the idle groove or non-knitting position where the knitting cams can have no action on the needles and where they remain quiescent until they are depressed into knitting position once more. The usual positions of the left-hand and right-hand pickers respectively are indicated by P1 and P2 where the stitch cams will be noticed to have a sharp indenture and it is exactly here that the pickers are located close to the cam so that they catch the first butt immediately and throw it up into the non-knitting position. This action takes place on each side during the narrowing of the pocket for the heel and when the pocket has to be widened again it is done by means of a depressor located further round the circumference. This depressor is T-shaped and the needles are depressed on the left by passing under the left wing of the T and on the right, they are depressed by passing under the right wing of the T. As has already been described in this series, the depressing is done two needles at a time on each side, but one of the two needles is immediately caught again by the picker below and thrown once more into the idle groove so that there is at each depressing operation a net gain of one needle put into knitting action.

When one studies this cam box after all the systems which have preceded it in the line of progress, one wonders why the simplified cam arrangement was not thought of earlier because the method of bringing the reciprocating knitting is the simplest possible, the cams are fixed and immovable and all this induces accuracy of work, and reduces the need for frequent repairs. Snap cams and sliding portions of a mechanism frequently get clogged up and thereby have their action impeded.

Automatically Turned Welt.

A study of the system of cams in Fig. 1 will show a second cam marked AC at the right-hand bottom corner, this being termed the auxiliary cam A.C. used in connection with the automatically turned welt which is such a valuable feature of this machine's accomplishments. This cam is constructed so that it forms a groove along with the lower part of the upthrow cam UTC2 and the cam K and this groove is noted to have traveling in it the dotted butts of the auxiliary jacks designated by AJ. In this machine, between, in every second groove of the needle cylinder is placed a small steel jack which is provided with a butt which works in the groove just described. The function of these jacks is to push up the alternate needles of the machine so that a division will be made in the needles, the lower portion of which are pushed down out of knitting position and enable the corresponding jacks above to take alternate portions of the thread. In this connection it should be clearly understood that the auxiliary jacks are not attached to the needles above them in any way because they are simply slipped into the tricks of the cylinder in alternate grooves so that when the jacks travel up the left side of the auxiliary cam AC, the jacks in turn push up the needles above them into the higher position, thus making the needed division in the needles. As soon as this is done and the jacks have reached their highest position they are drawn down into their ordinary level once more by their butts passing down the groove on the right. The cylinder containing the transfer points is placed directly



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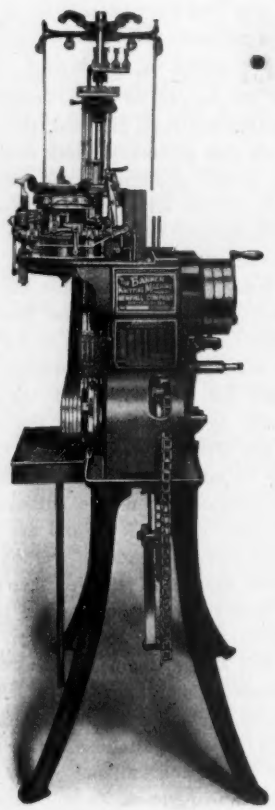

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above the cylinder of the machine after the manner of a ribbed dial with the points so placed as to be pushed out between the needles at right angles.

Figure 2 gives a view of the transfer points dial marked D exactly after the manner of a dial for making ribbed work where the grooves for the points radiate from the center and are spaced to come between the needles. The needles are shown in circles on the left, this being an elevation of the parts, and it will be noticed that there is one transfer jack for every two needles of the cylinder. In the center of the dial D is shown one of the transfer jacks

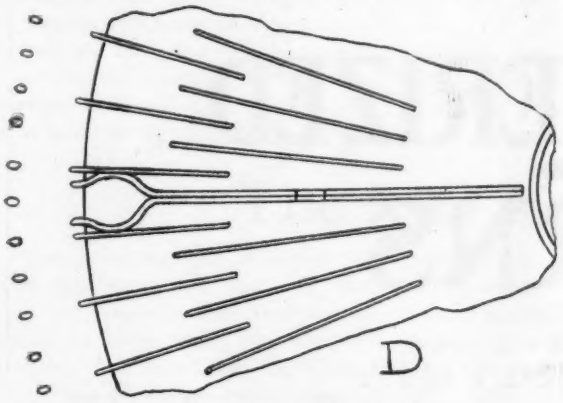

Fig. 2. The Transfer Points Dial.

in full detail and it should be explained that they are placed in the grooves in pairs each half being identical to the other except that the bend of the wire is in the opposite direction. Thus a pair of such points are placed side by side in one groove of the dial, the upper half bends upward and the lower downward as in Fig. 2, so that a space is formed just large enough to admit of the latch needle as it comes up.

The points obtain their movement from the butts which can be more clearly seen by referring to Fig. 3, which has been constructed to show a side view of the process. The

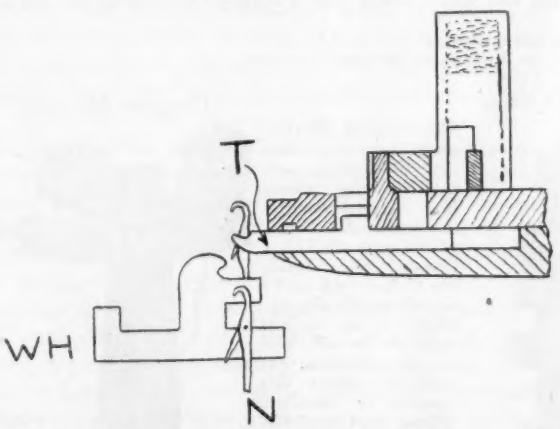

Fig. 3. A Detail Sketch of the Transfer Jack, Showing Position of the Needles When Taking the Yarn.

transfer jack is marked T and at the end of it is noted an indenture so cut as to admit of holding the yarn. The jack is shown to have its butt as an upward projecting piece on the right and on this a small cam works to give the jacks the essential out and in motion for the making of the welt and joining it up. This sketch also shows the exact form of the web holder WH and demonstrates its relation to the needles of the frame which are indicated by N. There is one web holder or sinker for each needle of the frame and it has two parts, the upper throat which takes the new yarn and the lower throat which deals with the old loop.

For the making of the automatic welt, there are two operations, first the feeding of the yarn to the jacks which hold the yarn during the making of the welt part in plain knitting, and secondly the transference of the stitches from the transfer jacks to the needles of the machine once more to continue the plain knitting on the leg. The function of the auxiliary jack cam has already been described as causing alternate needles to be raised, the needles not raised being pushed down out of knitting action. It is at those points where the alternate needles are lowered out of knitting action that the thread is taken by the jacks T just in the same manner as ribber needles would take their portion of yarn from the yarn guide, the alternate set of needles in the knitting position in the cylinder taking the other half of the thread and knitting as usual. The function of the transfer jacks from now onwards during the making of the welt is to hold those alternate stitches so that there is a puckering of the fabric inside the cylinder whilst the length of fabric for the welt is being worked. Fig. 3 shows the position of the needles, one down and one up during the time that the points are taking the yarn

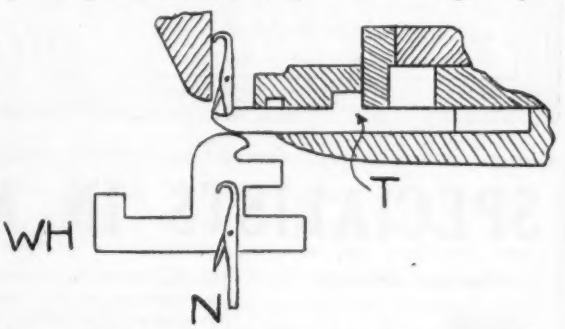

Fig. 4. Showing the Position of the Needle When Pushed Up by the Jacks.

from the guide to hold during the making of the welt. Fig. 4 shows the position of the needles when they are pushed up in alternate order by the auxiliary jacks and go right between the space made by the two transfer jacks as shown in Fig. 2 and when the needles are right between these spaces, the transfer points are all drawn back into the cylinder thus leaving the yarn transferred to the alternate needles of the machine.

All needles in the machine are again possessed of stitches and plain knitting is continued for the leg and foot. The placing of auxiliary jacks in alternate grooves of the cylinder enables a division to be made in the needles, those above the dividing cam being pushed up to knit in the ordinary way, whilst those under the dividing cam are pushed down so they do not receive their portion of thread. In place of these the transfer jacks in corresponding positions in the dial above are pushed out by their cam and receive alternate portions of the yarn after the manner of the dividing of the yarn in a one and one rib. When this is complete, the needles in the cylinder all come to a common level again and continue making plain work for the duration of the welt, the transfer jacks still holding the

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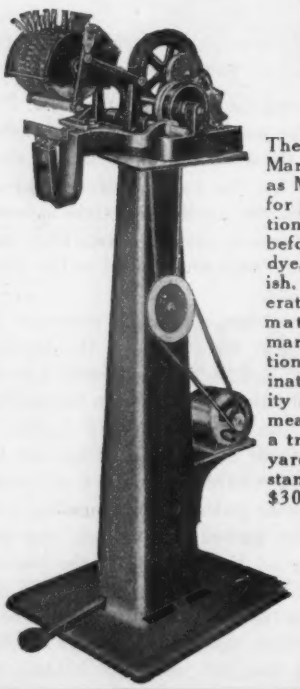

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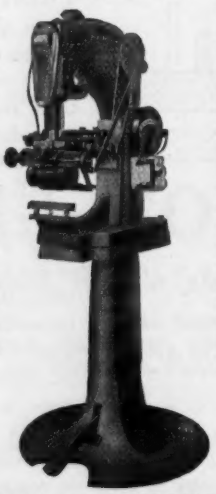

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yarn so that the piece is folded over double inside the machine in the ordinary ply over.

When this fold over is complete and the welt has been made the length desired, the needles are again divided alternately above and below the dividing cam and the needles which correspond with the position of the transfer points in the machine rise exactly into the space made by the transfer points as shown in Fig. 2 and receive the yarn from the points, which are drawn into their dial and thus lose the yarn to the needles. Owing to the long pull exerted on the fabric during the plying over of the welt piece during knitting, the pieces of yarn held by the transfer jacks to effect the connection with the main body of the hose are inclined to be drawn out longer, also they are only shown at alternate stitches which gives the join a somewhat loose and open appearance rather different to a welt made on the overlock or other machine. It is, however, a great advantage in increased production to have the welting done on the machine and there is also much less bulk and more elasticity than is the case with welting on a separate machine where there is always the tendency that the seaming or welting thread will penetrate to the face of the goods and show there. In practical work, the writer has found the machine, particularly in the fine gauges, rather susceptible to going out of order unless tended by skilled operators, the transfer jacks in particular are rather delicate and easily put out and bent by the presence of thick bits of yarn or knots in the knitting thread. It is an advantage to tune the machines to work as far as possible one quality of yarn, for when the machine has been once set correctly, it will work a long time without requiring much attention—in chinging the quality of yarn and weight of goods, it often requires considerable care to get the machine into proper working order again.

The Knit Goods Market

Prices of certain lines of hosiery bore evidence during March that production was well ahead of distribution. Men's and women's carded stockings were offered at the identical prices at which they were sold last year when cotton was five cents under the present market. Misses' combed and mercerized ribbed stockings were quoted a little higher than a year ago, but were available at the prices prevailing in the Spring of 1921. Misses' coarse gauge carded ribs were up 2½ to 5 cents a dozen.

Prices which jobbers have been paying this Spring have not been based on value as reflected in cost of raw materials. They bought low of those things of which the market was oversupplied, while paying profits for movable goods of which there had been scant production. A New York State underwear mill has rejected business in men's bal briggan shirts and drawers at an advance of 37½ cents a dozen over the opening. The mill was sold up to May 15 and turned down orders calling for earlier deliveries. Bal briggans had become a sort of drug on the market and output was curtailed. Then when jobbers wanted to buy for nearby deliveries they were willing to pay increases, but in some instances the goods were not available.

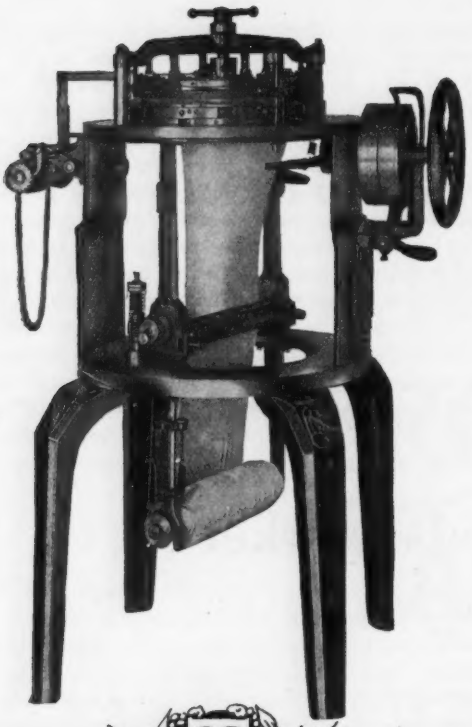
The cheap staple hosiery at last year's prices and bal briggan underwear in demand at advances serve to illustrate the point that pushing production ahead of distribution may not be good policy. Manufacturers never put stagnant business on a sound footing by accumulating stock and letting jobbers have it at a loss to the mill. They tried to do so several times in the last several years, it seems, judging from the scale on which production was being maintained while distributors were looking the other way when asked to pay prices representing a few cents a dozen above cost of manufacture. The paths along which the experiment was tried and retried are strewn with wrecks and factory plants going into decay.

There really was not very much warrant for jobbers to buy goods in excess of known requirements, and even these had to be gauged very carefully. In the first place, a lot of retailers were not paying their bills. There was no incentive for selling for Spring to a merchant who had not paid his Fall invoices. Mill representatives have been known to studiously avoid jobbers who were refusing the accounts of former customers.

A big part of the retail trade is responsible for the tardiness of business in knitted goods and, no doubt, other lines. A lot of community dealers of the smaller class were intent on unloading stocks at high prices, rather than push them out under the impetus of reasonable prices and buying for replacement. They seemed to figure that an exorbitant profit on a small volume of business would net them about as much as a reasonable margin on a large volume. And some of them have missed a lot of sales.

A leading department store in New York featured high price neckwear for men by offering it at a special sale at easily one-half the regular sales value. Men flocked to that neckwear counter as women ordinarily do to any nook or corner of some store where bargains are being advertised. Men who ordinarily would not think of buying more than one tie at a single purchase went away with from three to a half dozen. The realization that they were getting really good goods at pre-war prices was an inspiration for big buying. Every purchase in excess of normal detracts from the sales in the high-price stores for the next few months. The public will pay value for what it requires, but it still is bucking excess profits on what it buys, and thus business at the factory is being curtailed.

Aside from the retailer attitude generally, jobbers had other good reasons for refusing to speculate on textile products or the raw materials going into them. Up in New England the autocrats of labor were conducting a strike to compel employers to pay them more than the public was willing the merchant should pay the manufacturer. In the coal fields of several states, notably in Central Pennsylvania, miners were threatening a strike unless the public were willing to pay more for coal as a consequence of operators yielding to the demand for more pay and fewer work hours. In New England, where the strike was in progress, and in the coal zones, where strikes were being threatened, retailers were complaining they could not collect from customers and were refusing to pay their bills. Few could have bought goods, except for cash, had they wanted to do so. In both of the sections referred to there were exceptions, but not enough of them to have very much influence on the right side of business. Jobbers' sales in the strike-infected territories were insignificant. But business at the mill went on, and goods were accumulating,



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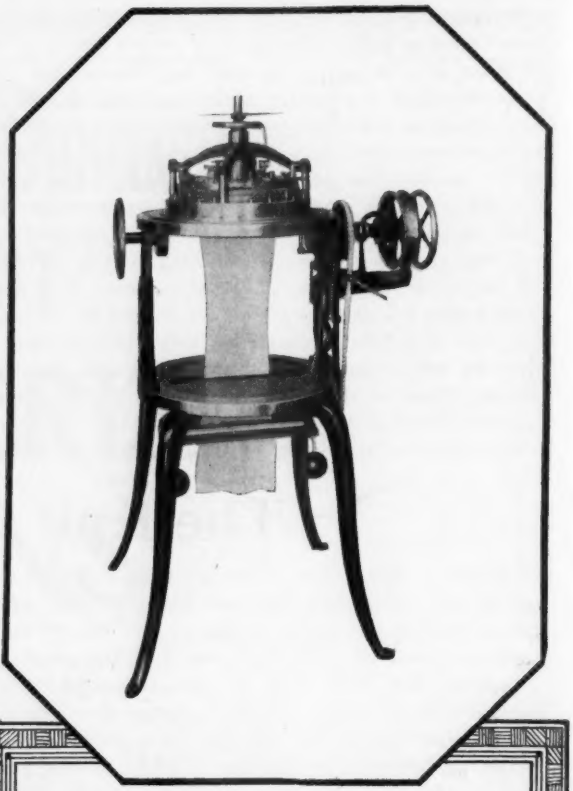

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whether distributors were finding an outlet for them or not.

Then there were sections where there were no strikes—sections where once thrifty producers were not getting enough out of their products from the soil. A farmer in Indiana drove 12 miles into Indianapolis with a two-horse load of oats. He sold the oats and all of what he got for them was paid to a department store in Indianapolis for four pairs of shoes for members of his family. This is vouched for by one of the proprietors of the store, who narrated the incident, while in the East recently, as one explanation why he himself was chary about paying mill prices for the few goods that he was willing to order.

All the while that the farmer couldn't buy his quota because he was not being paid for his labor in tilling the soil; while the cotton planter of moderate means was deferring his purchases of household necessities and trying to borrow fertilizer money, distributors in the regular markets were gauging their commitments by what was going through their warehouses, but production at the mill went on. Result: Enough goods of the class of staples to leave in the mind of the distributor the impression that he can buy as he needs and at about his own price and on practically his own terms.

There is maintained in Washington a Bureau of Standardization, one of whose many objects is to standardize production, eliminate waste and mass output with lower cost. There is a field for its operations in the hosiery industry. Mills in Tennessee recently made a further reduction in the wages of factory operatives because, it was explained, cuts had been made in the Carolinas, and Tennessee and Georgia had to follow to keep machinery running in competition. It is logical that mills in the North making like goods also will reduce the amount of their payrolls. But if the reductions and, presumably, lower prices to the customer, do not increase consumption, will mills keep on accumulating stock?

A brisker market for all kinds of hosiery is in sight, but it will not absorb this year or next the maximum output of all the mills based on their 1921-22 production. That many jobbers believe there will be goods awaiting them with the busy Spring season, that may be said to have dawned for retailers, was manifest in recent cancellations of hosiery orders that could not be reinstated at the prices at which the goods were contracted for. Cancellations when shipments were from two days to two weeks past due have been frequent. Most of the goods cancelled were bought last year, when cotton yarns were from five to seven cents a pound under today's prices. The jobbers will need the merchandise which they now are rejecting on the shallowest of excuses, but there is a disposition to work the manufacturer, who in the last several years is regarded by the average jobbers as having proved an easy mark.

A New England jobber cancelled that part of an order relating to low price goods which had declined after his order was placed, but he thoughtfully notified the commission house that the remainder of the order was to stand. This portion of the order called for novelties bought from a mill which had advanced its prices after booking a few trial orders. The commission house refused to cancel the low price goods and notified the unprincipled distributor that he also would have to take the novelties, even though they too declined. In this instance the dealer is financially responsible and the commission house management has the proper conception of a contract and does not balk at going into court to maintain a principle.

Another jobber rejected goods that were shipped when less than one week past due and gave notice of cancellation of an order relating to merchandise due for delivery some weeks later. Here was another seller with some backbone, and the buyer was notified that cancellation of the orders for which deliveries were not yet due would not be accepted unless he took in and paid for the goods which went out a few days late. He put the merchandise in stock. When orders are being cancelled at the opening of a prospective good season there can be no encouragement for manufacturers to accumulate stock or contract for yarns for anticipated requirements.

The condition of the market for low end staples in hosiery is indicated in the following prices: Automatic top 176 needle half hose, 72½ cents a dozen; full seamless 176 needle socks with regulation cuff, 90 cents; women's sewed toe 176 needle stockings, weighing about 20 ounces to the dozen, 80 cents; misses' carded ribs, weighing 28 ounces on size 9, 90 cents on size 7; misses' 300 needle combed ribs, $1.65 on size 7; misses' mercerized, $2.75 to $3 on size 7; boys' 3-pound ribbed stockings, $1.65.

Combed half hose, one of the really good sellers last year for the current season, have been dull for some weeks, but quite recently jobbers appeared to be more keenly interested, but objecting to the price—$1.65 for a high grade sock with double sole. The stocking has been viewed as one of the better 25 cent retail sellers in the range of half hose, and in some quarters is expected to hold its own against top mercerized socks which were brought out in competition. A very good grade of all-mercerized half hose, with embroidered clocks, was put on the market as a 50 cent retail seller, and from the standpoint of both fabric and finish it looks as though it might be a winner.

When raw silk was commanding around $8 a pound not so many weeks ago dealers were afraid of silk hosiery, and when it got down approximately to $1.50 they were still out of the market, on the ground that it was contrary to their policy to operate in a declining market. So they approached the busy season with little or no stock. This is true more particularly as to silk half hose, which have been among the quietest things among hosiery. Silk half hose to retail at 75 cents a pair for plain, and a dollar for the embroidered, are looked on as a good profitable proposition from the standpoint of volume of sales. But manufacturers say good socks at such prices are almost an impossibility for mills figuring on a profit.

Women's seamless silk hosiery, besides suffering their share of the market stagnation, have been hard hit by the increasing output of full fashioned, of which some interests foresee an excess production. The Textile Machine Works, Reading, Pa., is selling about 40 full fashioned machines per month, and probably as many are being imported. With this added equipment going into operation, it is obvious that this year will witness a materially larger output of full fashioned silk hosiery than last year, when 16 mills, large and small, were idle about nine months by reason of strikes. Thus far, machinery has been set up faster than knitters have been trained, and union help, more especially in Philadelphia, is criminally indifferent, with skilled knitters drawing from $80 to $90 per week. So long as such wage scales obtain, there will be no surplus

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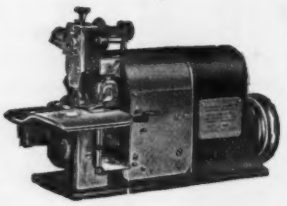

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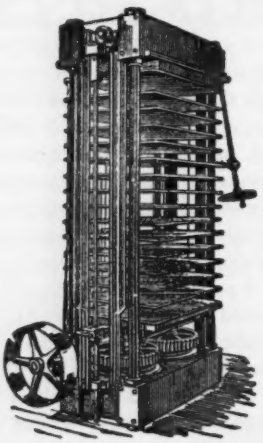

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of full fashioned hosiery, but if surplus production force prices down there will be a tumble in wage schedules.

Mills depending largely on union help find it practically impossible to train help. Non-union mills are better situated in this respect, and it looks as though they will be able to dominate the situation when the time comes that mills shall be turning off more hosiery than jobbers can put into distribution. Lower prices for full fashioned will cut still further into demand for seamless. In the circumstances, there is considerable market uncertainty over silk hosiery, and Japanese interests did not help matters by arbitrarily putting prices on a fictitious level.

Some houses report a fine outlet for ladies' seamless standard silk boot hosiery in fancies, with the drop stitch and embroidery. Several mills are reported working over time on this class of goods, which jobbers think ought to be priced around $9.50 to $10.50 a dozen. To make a complete success of the marketing of seamless hosiery, it is believed, jobbers and retailers will have to be content with a diminished profit per dozen. Last year a great many women, who thought they were buying fashioned because they were paying the price, really got the seamless with the fashion marks. Now they want to see the seam that extends from the top to the toe, the mark of the shaped stocking.

Just at this stage of the hosiery market, novelties provide a gamble with more to keep the mind occupied than a speculator usually can find in dealing in stocks on the exchange. Foremost among the questions which are puzzling manufacturers, and thousands of dealers as well, is that of shades, with the extent to which wool and mixtures in heathers and otherwise will figure in competition with the ever popular silk.

While still the winds were sharp and stinging and temperatures fluctuating with the transition from Winter to Spring, heathers seemed to disappear from the street in a twinkling, plain colors and shades taking their place. Then was presented the problem, will plain shades be the order for next Winter, or will heather color effects return? If not heathers, what are likely to be the fashionable shades? For several weeks the laboratories of dye makers and dyers have been experimenting with and bringing out shades indicated by manufacturers and important distributors. Nude, camel's hair and several grays were the basis from which they worked in the light shades. Varying interests wanted something a trifle deeper or a bit more subdued than the shades shown in the catalog of the standard color card association. They were working up to a confusing situation for mill and distributor, leaving the latter puzzled as to just how he might describe what he wanted to order.

Jobbers would prefer that there be no deviations from the standards, and many manufacturers would rather the matter of shade had been left that way. But there was a rivalry for producing something different, just as has existed in the production of heathers until it would seem that the gamut of color combinations had been run.

Hosiery of all wool and wool in combination with silk or artificial silk seems entrenched for next winter, whether in heather effect or in plain colors or both, remaining an important question. It is the common opinion that the plain in fetching shades will be popular the year round, but that since the sports dress has become a large part of every dressy woman's wardrobe there must and will be heathers. The tweeds for skirts have been responsible for many of the recent hosiery innovations. One leading mill shows sports stockings for ladies in fifteen shades, and eight shades for fancy stockings not altogether in the sports class.

If there be any lack of heathers it will not be the fault of manufacturers who have essayed their production. In fact, there is heard the prediction that heathers are destined to be overdone. They have been brought out from mills which have had little experience with them and some of which may wish before the year is ended that they had none. There will be such an abundance from mills upon which leading distributors place sole dependence—mills which have gone through the fire of cross dyeing, slub dyeing and all other forms for methods for producing color effects—that if there shall be any surplus the newcomers will be the last to win favor. In abandoning staples for novelties, no doubt, a number of manufacturers have gone from one unprofitable extreme to another. With an excess of machinery it is difficult to hit upon a happy medium for keeping it in operation.

A Philadelphia mill with a capacity of 1,000 dozens of misses' ribs and women's mercerized stockings per day is having a production of 150 dozens. The mill is making a line of fancies in mercerized and is making all that it can with the machinery at its disposal. It could sell mill capacity output of this type of stocking and make a little money but there is not a profitable market for what can be made on the machines that are idle. There are many like illustrations of the spotty condition in the hosiery market. Demand and production are sadly out of balance.

One Pennsylvania mill with a large output is practically sold up of infant's combed and mercerized socks to the end of the season, and could use a few more operatives. In the circumstances this mill is offering nothing for the present season, while some have had their samples on the market, with no responses from jobbers. Since taking the lines off after selling up for the first quarter of the year they have had to name slightly higher prices, to compensate for the increased yarn cost. Jobbers are objecting to the advances, even in the face of no great supply of socks for the season.

It is a peculiarity of the hosiery trade situation that while there is excess production and more than 75 per cent of the mills are operating at considerably less than capacity, a manufacturer here and there is rejecting orders calling for April-May deliveries. The crucial test may be expected to be witnessed by May. If business does not pick up by that time there will be fewer mills operating; and if more adequate prices cannot be obtained, those which continue to operate doubtless will still further curtail output. One of the large mills in the Central West already has cut down its working force, and since doing so has been unable to fill a few small orders for certain numbers. "Our mill organization has been shot to pieces," an executive of the mill said, "we could not keep it intact for supplying wholesalers buying on a retailer basis."

It develops in talks with manufacturers that not a few mills which are running—hosiery, underwear and sweaters—would be closed but for the fact banks are carrying their loans and the moment the mills ceased to produce, would insist on their liquidation. "We are running because our bank will not let us close down," said one mill

(*Continued on page* 449.)

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The Yarn Market.

One feature of the Philadelphia cotton yarn market during the past month was a rise in quotations that affected the carded section of the list generally. The increase held for a period of about ten days or so, beginning along the latter part of February. It is interesting to note in this connection that this rise consisted of an increase from the lowest price in about seven or eight months to a fairly notable higher level—30s two-ply carded warps, a representative number, going steadily from a published quotation of 35 cents to around 38 cents, the former price representing the lowest quotation on this count since September 2. It is also of note that an order for carded yarns for a western hosiery manufacturer, said to be the largest single deal put through this market in many months, was confirmed, after these yarns had made an ascension on the price range.

Searching for ordinarily common features as being the probable cause for this strengthening in prices, results in the discovery that this rise was made by the carded group in spite of, rather than because of, what are generally termed index factors or conditions in determining the trend of rates. One of these factors is the amount of yarn existing on the market, and certainly it was no dearth of supply that caused the increase in rates, for during many days and weeks past there has been ever evident a pronounced surplus of goods on hand. This, incidentally, has had its effect in other directions just the same; in cases an over-supply caused the holders thereof to sacrifice in order to dispose, and its influence was noticeable in the attitude of both sides of the market.

And certainly the well known factor of a rushing business for these yarns had no part in increasing their values. For a long time, as has been reported, there has been a dull and sluggish feeling in the market from a buying standpoint, and in the general run of things, with some exceptions as that just cited, buying has been of a decidedly hand-to-mouth and piece-meal variety. Had there been a sudden onrush of buyers desiring yarns in sufficient quantity to even reduce the surplus, possibly some influence could have accurately been attributed to this cause. But such was manifestly not the case.

Still, carded yarns strengthened, and factors in close touch with conditions attributed it to the remarkable stability that the raw staple was experiencing during that time; also some influence was attributed to a firm stand on the part of spinners to secure prices for their product that would, at least, allow them to "break even" on manufacturing costs.

In building this structure of higher rates, however, unfortunately, carded yarns didn't have a sufficiently strong and durable roof to withstand the pressure of the continued and unusually effective paucity of business and the increasing magnitude of surplus stock. These factors combined into a force which caused these yarns, on about the 10th of March, to leave their higher planes and begin a gentle descent, and at present writing they are some little bit off from the high mark.

During the month there came a decided and noticeable curtailment in the southern section, on some types of product. It was pointed out, however, that these mills had been manufacturing so long, that there had been so much ingress and so little egress at their warehouses, that their reduction in running time and production was more of an effort to reduce the size of the surplus stocks than desire to create higher prices.

Throughout the month, with more sluggishness in demand and an increasing stock of spots, the combed section of the list showed rather a tendency downward in price, and with an apparent variation in quotations, making it appear as if yarns were being unloaded in some quarters, when they were really sold, for whatever they would readily bring. There was reported the instance of a dealer who quoted $1.35 a pound on 80s/2 combed peeler yarn, for publication, but who sold without much question at $1.20.

Variations of considerable latitude were also noted in the carded section, making it necessary, even with a perceptible trend upward for part of the time, to report their quotations in very general terms. This difference in quoted prices is declared to be due to the fact that almost every day the gap widens between those who believe in much higher cotton and yarn values, ultimately and subsequently, and those who count on a continued lack of demand and a growing surplus of yarn stocks to break the market.

And speaking of what the future holds for the market —for nearly everyone is—opinion, as always, is divided. There are those who feel that existing conditions augur for a decrease in the amount of the cotton crop, with a resultant increase in values both in the raw staple and in yarns; that consumers' stocks are of necessity depleted, and that with that long hoped for and anticipated revival of business in all quarters, buyers will be brought to market for more yarns and reduce the surplus; that costs are being settled and more accurately determined; that buyers will see the spinners' side of it; and that for the long pull, if the remaining hills and dales of the present business "graveyard" can be negotiated to the accompaniment of the "merry little whistling tune," things will come around all right.

The opposition presents an increasing surplus of yarn accumulating; predicts a break in cotton, an irregularity in the production costs of spinners, the effect of which is already noticeable in that some are selling what others can't seem to move; assert the fact that the yarn consumer wants his yarns at even lower prices; that for instance the hosiery man is trying to base his cost of material on what his prospective customers say they are willing to pay, which means in essence, selling at pre-war prices, and as he does not expect to be able to further substantially reduce his payroll, overhead and other items of manufacturing cost in the near future—he's already done that—he must buy his yarns on a lower basis or not at all.

Quotations on the Philadelphia market on March 15 follow:

Southern Single Skeins.

4s to 8s	28½	10s	29½@30
12s	30½	14s	31
16s	31½	24s	33½
26s	34½	30s	36

Southern Single Warps.

8s	29	10s	30
12s	30½	14s	31
16s	32	20s	32½@33
26s	35½@36	30s	36½@37
40s	52		

Carpet and Upholstery Yarn in Skeins.

8s and 9s 3-4 slack	27
8-2-3 tinged tubes	21½@22
8-3-4 hard white warp-twist	26
8-3-4 hard twist waste	20½

Southern Two-Ply Skeins.

8s	28½	10s	29½@30
12s	30 @30½	14s	30½@31
16s	31 @31½	20s	32½@33
24s	33 @33½	26s	34 @34½
30s	36	40s	52

Southern Two-Ply Warps.

8s	29½	10s	30½@31
12s	31 @31½	14s	31½@32
16s	32½@33	20s	33 @34
24s	34½@35	26s	35½@36
30s	37 @37½	40s	52 @54

Southern Two-Ply Combed Peeler Skeins and Warps.

8s to 16s	50	20s	53
24s	54	30s	60
40s	70	50s	80
60s	90	70s	$1.05
80s	$1.20		

Southern Frame Spun Carded Yarn on Cones.

8s	29	10s	30
12s	30½	14s	31
16s	31½	18s	32
20s	33	22s	34
24s	34½	26s	35
30s	37 @37½	40s	52 @54
30s double carded			43½
30s tying-in			35½

Northern Mule Spun Carded Yarn Cones.

10s	33	12s	34
14s	35	16s	36
18s	37	20s	38
24s	39	26s	40
30s	43	40s	55

Northern Mule Spun Combed Peeler Yarns on Cones.

10s	43	12s	44
14s	45	16s	46
18s	47	20s	48
22s	50	26s	52
28s	56	30s	59
36s	65 @67	38s	68
40s	70 @72		

Among the Knitting Mills.

Union Manufacturing Company, Union Point, Ga., contemplate the construction of an extensive addition to the manufacturing plant, to be one-story, of brick construction. They will install forty new knitting machines.

The Miller Knitting Mill, Shenandoah, Pa., are taking bids on separate contracts for the erection of a six-story addition to the underwear plant. Work will be commenced at an early date.

R. P. Shapard, of Griffin, Ga., and A. W. Wheeler and P. T. Cuthbert, have petitioned the superior court at Griffin, Ga., to be incorporated under the name and style of the Spalding Knitting Mills. The principal office of the company will be in Griffin and the company will engage in the manufacture of hosiery and underwear.

Plans are being formulated for the establishment of a hosiery mill in Andalusia, Ala. The plant will make a high class mercerized cotton hose, and it is the intention of the proposed company to manufacture silk hose a few months after operation has started. The Chamber of Commerce is backing the movement for the organization of the company.

The American Hosiery Company, New Britain, Conn., are constructing a 40 by 80-foot boiler house, to cost $20,000.

A one-story plant will be built by the Security Mills, Inc., Newtonville, Mass., to be operated as a branch of the main plant at West Newton. It will be 60x150 feet and will cost about $50,000.

The Acorn Hosiery Mill, Reading, Pa., is preparing for the construction of a new three-story mill at Mahanoy City, Pa.

Sheplan, Sabul & Palmer, 15th and Wallace Sts., Philadelphia, Pa., manufacturers of knit goods, have awarded contract for the erection of a new four-story plant, 127x150 feet, to cost around $100,000.

Improvements to cost $3,000 will be made at the Reading (Pa.) plant of the Taubel-Scott-Kitzmiller Co. An addition of 100 footers, 130 ribbers, electric motors, etc., increasing the daily output to 2,500 dozen pairs of hosiery will be made at the Cleveland (Tenn.) Mill of this corporation.

John Blood & Co., Inc., Philadelphia, Pa., will build an addition to their plant, to cost about $40,000. It will be 64x78 feet, and will be located at Somerset and Franklin Streets.

A new power house is to be built by the Oscar Nebel Knitting Mills, Philadelphia.

Enlargement of facilities will be made by the St. Clair Hosiery Mills, Belleville, Ill., following a recent increase in their capital stock from $25,000 to $50,000.

The Conway Knitting Co., Oswego, N. Y., is considering the erection of a new one-story warehouse at their plant.

Organization of the Penbrook Knitting Co., has been perfected by a group of Harrisburg (Pa.) men who have started the erection of a hosiery mill in Penbrook, Pa. They plan to have the mill in operation soon, and they will employ about 75 persons. The building will be one-story 30x100 feet. Sixteen knitting machines will be installed at first, but this number will be increased later. Officers of the new company are: Dr. Jesse L. Lenker, president; Charles A. Hoak, vice-president; R. L. Unger, treasurer. Walter Thrush will be superintendent.

The plant of the Popular Knitting Mills, 103 Throop Avenue, Brooklyn, N. Y., was damaged recently by fire.

The Delson Knitting Mills, Inc., Chicago, Ill., has filed notice of increase in capital from $50,000 to $150,000 for proposed expansion.

The Sexton Manufacturing Co., Fairfield, Ill., has plans under consideration for the erection of a new two-story knitting mill at Olney, Ill.

The W. & M. Knitting Mills, New York, N. Y., will establish a knitting mill in leased quarters at Hester and Eldridge Streets.

The Wilkinson Knitting Mills, Inc., Tunkhannock, Pa., have taken over the plant heretofore operated in the name of Thomas Wilkinson, and plans are under way for general expansion.

L. S. Baker, North Carver, Mass., is planning for the erection of a new two-story knitting mill.

The Seckler Brothers Knitting Mills, 512 Fifth Avenue, Brooklyn, N. Y., have removed their plant to 352 Classon Avenue, to provide for increased facilities.

The Erlanger Underwear Manufacturing Co., Baltimore, Md., manufacturers of knit underwear, will immediately begin the construction of a one-story mill, 80x110 feet, to cost about $38,000.

Elks Piece Dye Works, New York City, recently installed a "Hurricane" automatic loop dryer, for handling their dyed tricolette and jersey cloth. This improved equipment greatly increases their facilities for prompt service to their customers.

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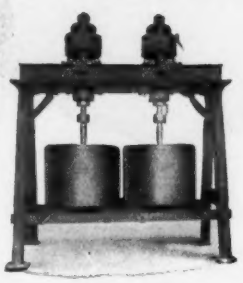

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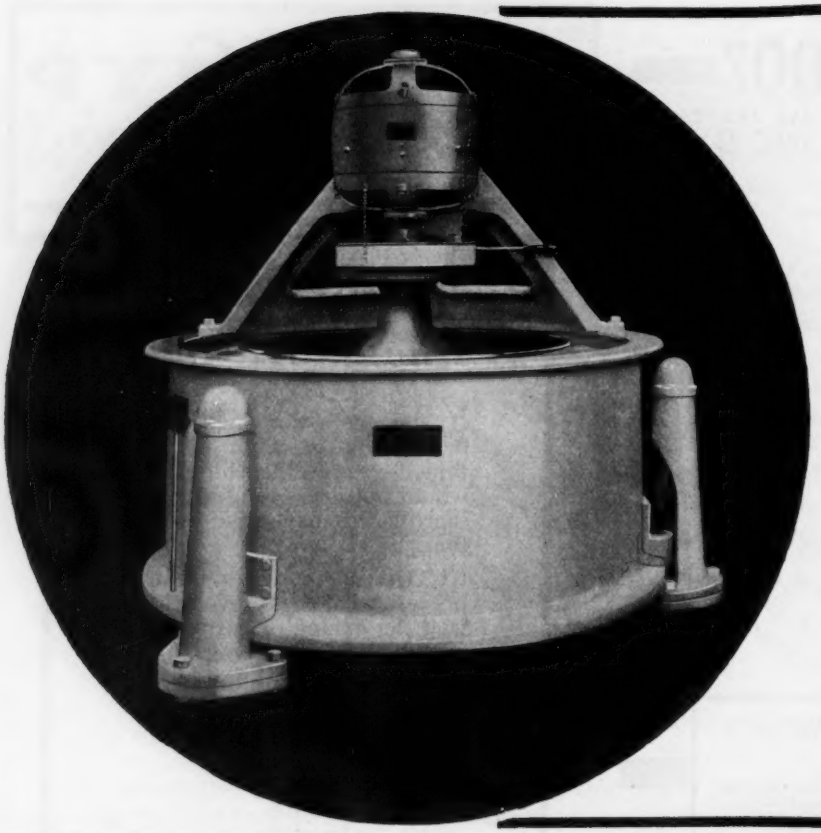

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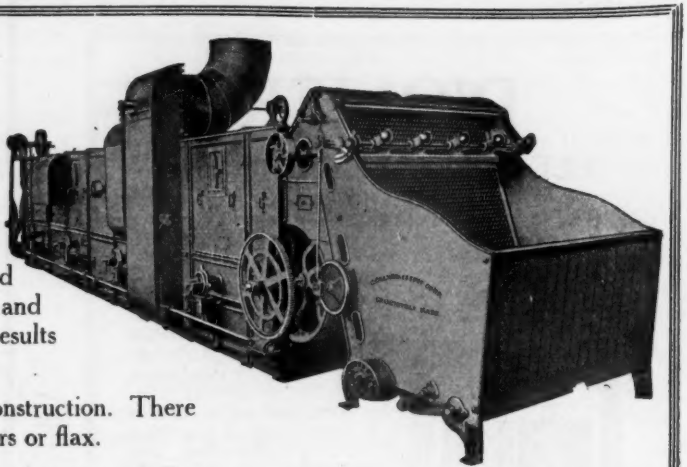

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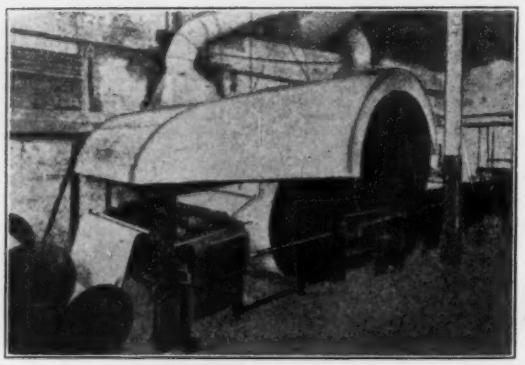

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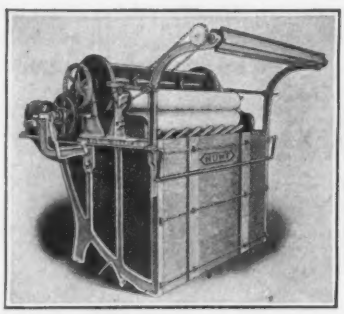

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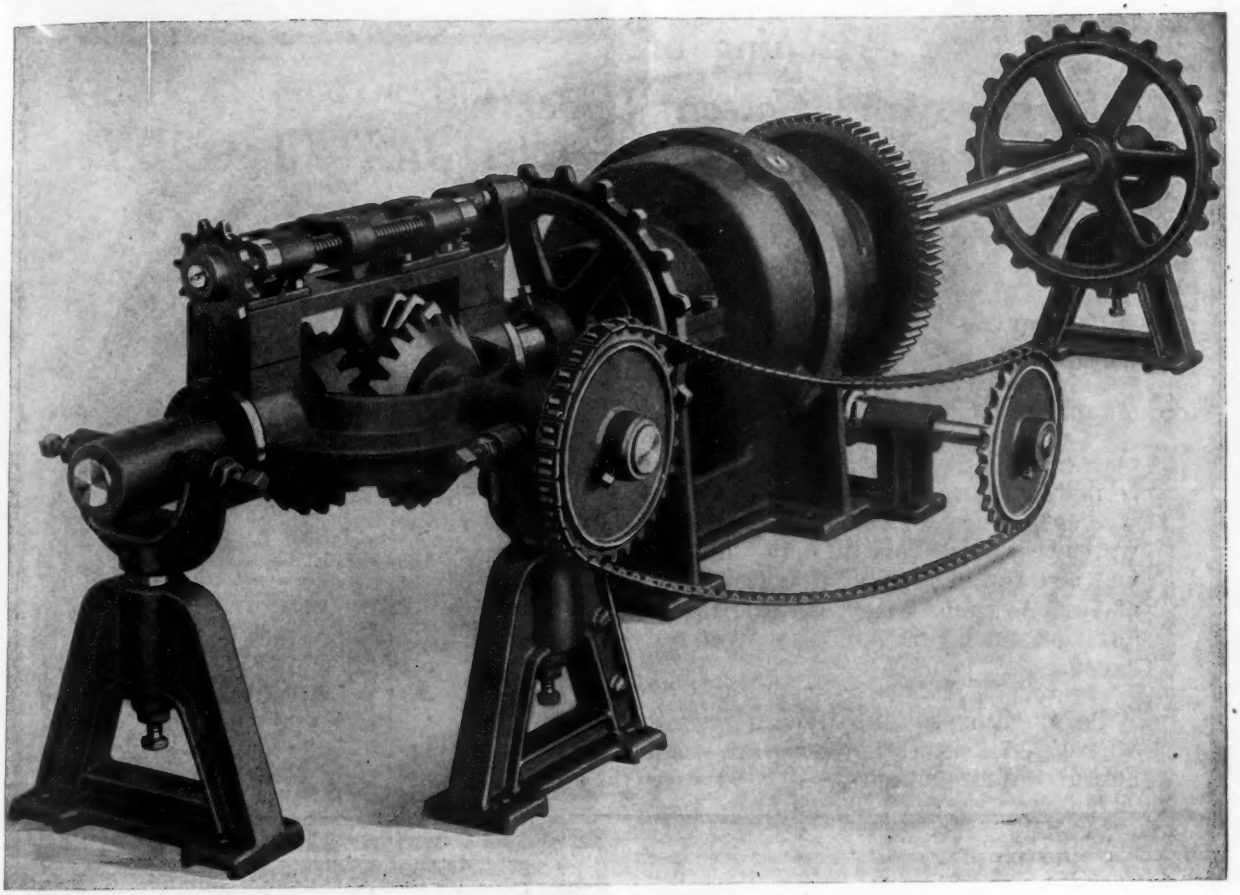


COCKER Automatic Variable Speed Tension Control for Use in Connection with Cocker Continuous System of Warp Dyeing and Warp Dyeing Equipments Using Dyehouse Warp Ballers in Connection with the Vat.

The Cocker Automatic Variable Speed Tension Control, shown in the above photograph, is operated automatically by means of a compensator or drop roller around which the warps pass, and which is located between the squeeze rollers of the vat delivering the warps and the squeeze rollers of the vat or the ballers that are taking these warps up in the next operation. The raising or lowering of the compensator or drop roller, in its action in connection with the variable speed control, will cause an increase or decrease in the speed of the squeeze rollers, as the condition may require to keep the tension correct.

The Cocker Automatic Variable Speed Tension Control is operated by gears. It is therefore positive in action as there are no belts to grow slack and no frictional load to vary.

The Cocker Automatic Variable Speed Tension Control can also be used to advantage in handling fabrics in processes where they are led through a series of operations wherein it would be of advantage to maintain a definite speed for the fabrics between operations that would prevent them from becoming either too tight or too slack.

COCKER MACHINE & FOUNDRY COMPANY

GASTONIA NORTH CAROLINA

"Specialists in Designing and Manufacturing Machinery for the Making and Handling of Warps"

DESIGNERS AND BUILDERS OF

WARPING MACHINERY

- Linking Warpers
- Balling Warpers
- Beaming Warpers

WARP BEAMING MACHINERY

- Short Chain Beamers
- Long Chain Beamers
- Warp Splitters

WARP DYEING MACHINERY

- Indigo Vats
- Boiling and Cooling Machines
- Wash Boxes
- Sulphur Vats
- Sizing Machines
- Continuous Systems
- Doubling and Splitting Systems
- Warp Coilers
- Dyehouse Ballers
- Drying Cans
- Hydro Sulphite Equipment

True Matching of Silk Hose and Cotton Upper Made Easy

A mill of national reputation producing silk, cotton, woolen and mixed hose, experienced difficulty in their dyeing processes. In August, 1919, they installed Permutit Water Softening Equipment, to remove all hardness from their water supply, and immediately noticed many manufacturing improvements.

One of their most difficult processes had been to match the color of silk hose with its mercerized cotton upper in one dye bath, but when soft water was used this difficulty disappeared. It was also found possible to match difficult shades at various times with the same formula, and in addition much time and labor from redyeing was saved.

Permutit is solving dyeing problems everywhere. All investigations are made free of charge. Write us today.

This booklet contains valuable information that every mill operator should have. Sent free, postpaid, upon request.

The Permutit Company
440 Fourth Ave. New York

Filters—Water Softeners—Special Apparatus

FILTERS

PRESSURE GRAVITY

Especially designed to meet all requirements of Textile Mills.

Economical in upkeep.

Perfect satisfaction.

NORWOOD ENGINEERING CO.

Florence Mass., U. S. A.

CHAS. M. SETZER, Southern Representative,

Charlotte, N. C.

DURABLE K-W UNIVERSALLY USED

KLAUDER - WELDON DYEING - BLEACHING- SCOURING MACHINERY

There are K-W machines in use which were built nearly half a century ago and which are still doing their work efficiently and economically under severe service. This is sufficient evidence of the durability and capability of K-W machines after long years of subjection to the ravages of live steam, heat and alkalis.

K-W Machinery, by its accomplishments, has steadily and irresistibly built up a reputation that has made the name "Klauder-Weldon" synonymous with the **"world's best dyeing, bleaching and finishing machinery."**

Our interest in upholding the K-W reputation means that you MUST be satisfied, and our suggestions to prospective purchasers are made with the view toward solving any dyeing, bleaching or scouring problem for all time. We will be glad to answer any and all questions without obligation on your part whatsoever.

Write today for K-W Literature

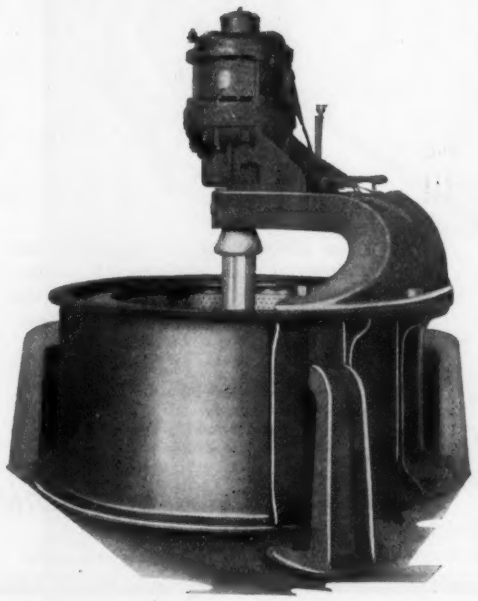
THE KLAUDER-WELDON DYEING MACHINE CO.

Bethayres, Pa., U. S. A.

H. G. Mayer, Southern Agent,
Realty Bldg., Charlotte, N. C.

VERTICAL MOTOR DRIVEN

HYDRO EXTRACTORS



Type VM Self-Balancing Textile Extractor

Safety is made certain by heavy reinforcing bands around basket. No belts or dangerous open parts.

Economy is assured by effectively lubricated oversized ball bearings. Rugged flexible coupling eliminates clutches, with their consequent frequent need of repair and adjustment.

Ease of Operation is afforded by the combination of push button control and interlocking band brake.

Durability, for which all Fletcher extractors are noted, is guaranteed by sturdiness of construction, simplicity of design, and generously proportioned wearing parts.

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FORMERLY SCHAUM & UHLINGER

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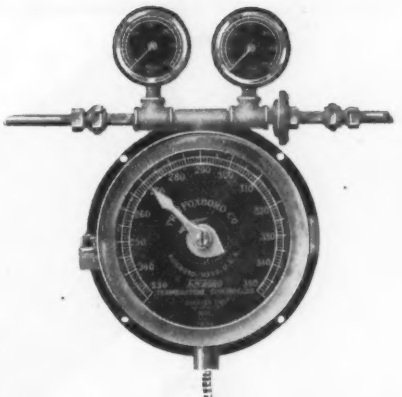
Sales Agents:

R. R. STREET & CO., 28 N. Clinton St., Chicago, Ill.

HURRICANE ENG'G CO., 53 State St., Boston, Mass.



Prevent Size-Box and Dye-Tub Losses

Losses of considerable magnitude are often traced directly to uneven temperatures in size boxes and dye-tubs. Installations of Foxboro Temperature Controllers prevent these losses.

Foxboro Automatic Temperature Controllers are practically designed and rigorously tested, assuring dependable service at all times and under all conditions. Air is used as the operating power, making them positive, accurate and flexible in action. To set, it is only necesary to move the index hand to the desired point on the calibrated dial. Once set the instruments work without further attention.

Our Engineering Department gives special attention to controller installations and is prepared to investigate your problems and advise on the best equipment for your particular case.

Write for Bulletin A.S.-127. It gives information on Foxboro Automatic Temperature Controllers.

THE FOXBORO CO.

Incorporated

FOXBORO, MASS., U. S. A.

New York Chicago San Francisco
Tulsa Pittsburg Philadelphia
Birmingham

FOXBORO

118-132 TRADE MARK

DEVELOPENE

Makes Black Blacker

Manufactured Only by the

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Aqua Ammonia and Ammonia Salts

Tycos

Temperature Instruments

Every *Tycos* instrument is representative of an industrial and engineering organization that enjoys well deserved prestige for results accomplished in the indicating, recording, controlling of temperatures.

To have a catalogue placed in your hands without expense, just write—and give firm connection if you please.

Taylor Instrument Companies

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Theres a *Tycos* and *Taylor* temperature instrument for every purpose

824

What Is An Equitable Return

In the making of

Wyandotte Textile Soda
Wyandotte Concentrated Ash
Wyandotte Kier Boiling Special

the first point considered is the service which they render the user. For unless their use returns some distinct advantage there will be no place for them in the business world.

The second point considered and without which the first amounts to but little—does their cost constitute an equitable charge for the service they return, that is, a charge which will enable the user to realize a profit on the service rendered, and a charge that will enable the manufacturer to continue their production.

The rapidly increasing use of these Wyandotte Special Alkalies is the proof offered that they return a consideration equitable both to the user and the producer.

Order from your supply house.

The J. B. Ford Co., Sole Mnfrs.,
WYANDOTTE, MICH.

Every user of Liquid Chlorine will be interested to learn of the development of the

Mathieson Multiple-Unit Chlorine Tank Car
(Patents Pending)

A Safe and More Economical Method of Shipping Liquid Chlorine.

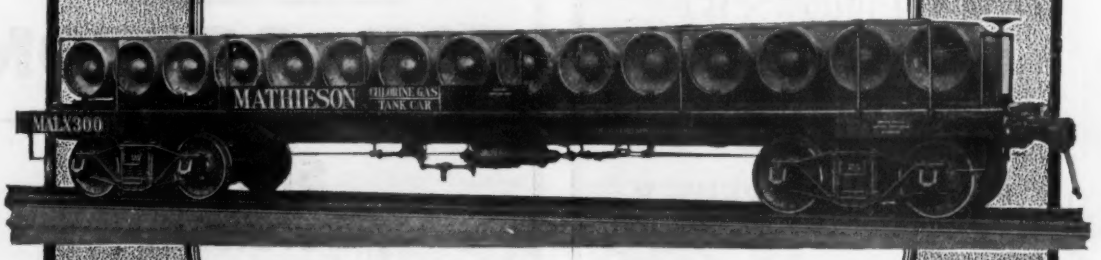
This new idea consists of a specially designed car carrying 15 one-ton individual containers.

Individual tanks are convenient and safe to load, ship, handle and store, and deliver the full quantity of liquid purchased. Constructed of seamless forge-welded steel, pressure tested to 500 lbs. per square inch, which comply with Interstate Commerce Commission specifications.

The exterior and interior metal of each container is available for inspection at all times. Individual units cleansed and inspected before each charging.

It is the New and Practical Way to Buy and Ship Liquid Chlorine in Bulk Quantities.

We'll gladly send detailed information to those interested.



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ALKALI WORKS, (Inc.)
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Established 1815

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Oldest in Years. Youngest in Spirit
Modern in Ideas. Progressive in Methods
"Service" Our Motto

All kinds of
Warp Dressings, Finishing Materials, Soaps,
Soluble Oils, Etc.

Please Submit Your Problems to Us

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FOR COTTON COLORING

UNIFORM IN QUALITY THROUGHOUT

SULPHUR CUTCH B F
RED SHADE

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Anti-Chlorine Bleaching Process

FOR COTTON

Simple
Scientific
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Staley's Starch

Hundreds of our customers say Staley's Eclipse Thin Boiling Starch is the best obtainable anywhere - - - ideal for sizing - - - penetrates every fibre of the yarn - - - keeps the yarn smooth and soft feeling - - - gives it 10 to 15% greater strength - - - decreases shedding under the looms to a minimum - - - practically eliminates "seconds."

Other Staley Starches have been developed to meet perfectly every starch need of the textile industry.

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"BRETON" MINEROL "F"

For
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"It Prevents Harshness"

BORNE, SCRYMSER CO.
Established 1874
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BOSTON **PHILADELPHIA**
Works: Elizabethport, N. J.

AMALIE PRODUCTS

We Can Save You $500 - $3,000 Per Year

This statement to cotton mill owners is the result of a survey of savings effected in New England and Southern Mills.

Use Our Sizing Products

AMALOL AND GLUANTINE

in your slashing room and save $500-$3,000 (depending on your slasher equipment).

Less Expense for Sizing Materials.
Less Breakage and Seconds.
More Production.

Don't blame your weavers or machines.

Amalol and Gluantine will dress your warp perfectly. A well dressed warp is half woven.

Order a barrel of Amalol and Gluantine on approval—satisfaction guaranteed! Our cotton mill specialist will personally conduct practical test without obligation.

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The Weaver's Friend

It boils thin—it penetrates the warps—increases breaking strength and carries the weight into the cloth. Being thoroughly washed free of gluten and other foreign matter it gives a bleach and finish to the goods that you can get from no other starch.

A trial order will convince you that VICTOR STARCH has no equal on the market.

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If you are not already using VICTOR STARCH call on our representative for a demonstration at your convenience.

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EAGLE ★★★
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The experience of critical operators has shown this popular brand to be the most efficient sizing agent, both for additional WEIGHT and increased STRENGTH of WARP. Penetration accomplishes these important results.

EAGLE STARCH is specially manufactured to cover a wide range of fluidities to meet the needs of all classes of weaves.

EAGLE STARCH penetrates.

Corn Products Refining Co.

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Roller, Clearer and Slasher Cloths

Assured Quality and Prompt Service

We are in position to supply you with the highest quality in Roller Cloths, Clearer Cloths, and Slasher Cloths—

Roller Cloths made of the right material, with just the right cushion and uniformity of surface to produce perfect results—

Clearer Cloths constructed of highest grade material with thick strong nap that does not pull out and uniform length such that the rolls are cleared entirely of short fibre—

Slasher Cloth having sufficient cushion and porous enough to thoroughly force the sizing into the yarn.

Let us convince you of the real quality of our products. Send a small trial order today or write for samples and prices.

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MONOPOLE OIL
Reg. Trade Mark No. 70991

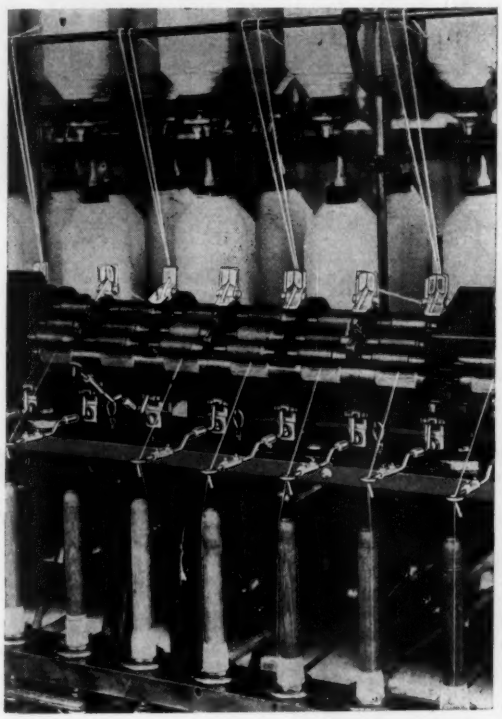
BLEACHING OIL
Kier boil Assistant

HYDROSULPHITE
For stripping and discharge printing

CREAM SOFTENERS

ALIZARINE ASSISTANTS

PASSING of the THREAD BOARD



In the process of developing the ECLIPSE AUTOMATIC STOP-MOTION for Spinning, we have been enabled to eliminate the old style thread board, which insures one less place for dirt to gather and one less place for the operator to clean.

Write us for facts.

ECLIPSE TEXTILE DEVICES

Incorporated

Elmira, N. Y.

The Schwartz AUTOMATIC ELECTRIC GUIDER

(PATENTED)

FOR STRAIGHT AND SWING TENTER FRAMES

"paid for themselves many times over"

says the Tupelo Cotton Mills, and this is the consensus of opinion among the many users of the Schwartz Automatic Electric Guider.

It will handle cloth of any kind, weight or width—the only guider known for handling fabrics with delicate surfaces, such as velvets, plushes, etc.

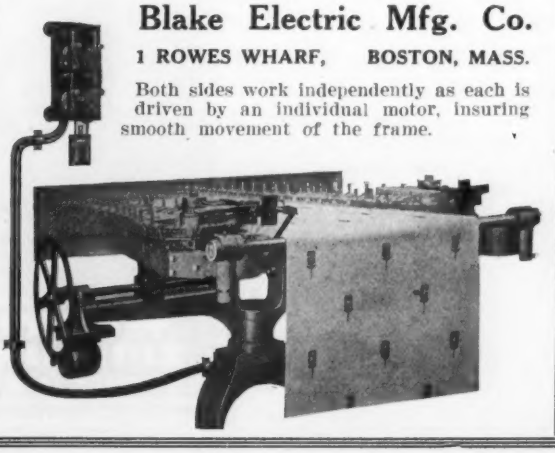
It has few parts, is simple, always reliable and requires practically no attention.

Manufactured and Distributed by

Blake Electric Mfg. Co.

1 ROWES WHARF, BOSTON, MASS.

Both sides work independently as each is driven by an individual motor, insuring smooth movement of the frame.



VERMONT SPOOL & BOBBIN CO.
OF
BURLINGTON, VERMONT.
There are two prime requisites in the production of superior bobbins and spools—the plant and long experience. We have both.
Our plant is equipped with the most up-to-date and efficient machinery. From the selection of the wood to the finishing of the product the same care is exercised in every department—uniform bobbins and spools of the highest class being the result.
Our long experience in the design and manufacture of spools and bobbins for textile mills all over the country enables us to understand your requirements and give you 100% satisfaction.
Give us a trial order and you will remain one of our satisfied customers. Write for prices.
"Good Goods at Fair Prices."
VERMONT SPOOL & BOBBIN CO

SPINNING RING SPECIALISTS SINCE 1873
SPINNING RINGS
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DIAMOND FINISH
TRAVELLER CLEANERS
TRAVELLER CUPS
GUIDE WIRE SETS
WHITINSVILLE
SPINNING RING CO.
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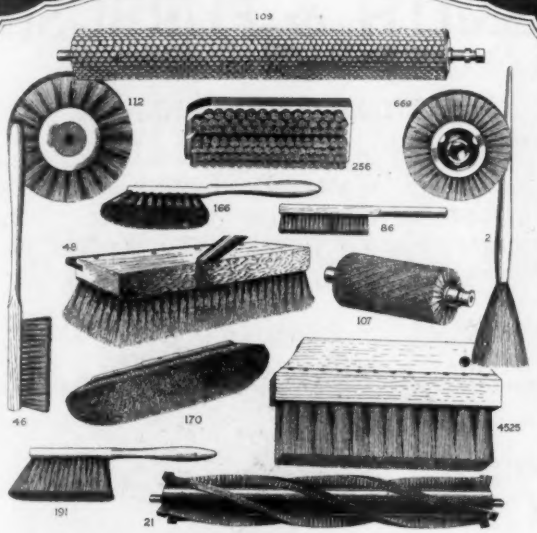


Every brush has a specific use

The manufacture of textile brushes calls for something more than mechanical skill. It requires a knowledge of cotton mill needs that is only derived by actual experience.

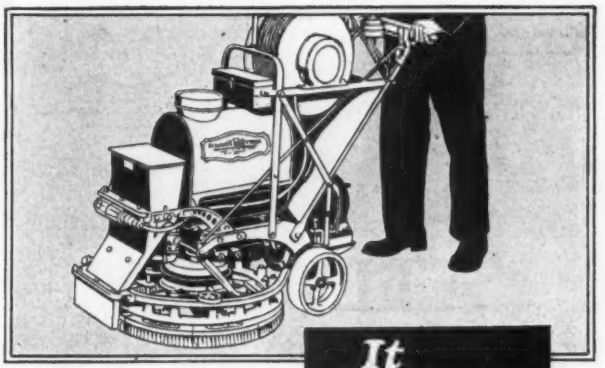
Every textile brush is made for a specific use, necessitating various sizes, shapes and varying degrees of bristle length and stiffness.

We make the brush to fit the need. We make to your own specifications or to our interpretation of the use it is intended. No matter what form it takes, or the service it must give, we can furnish a brush—the proper brush for every textile operation.

Also, we do repairing—the same standard of quality and skill used in brushes of our own manufacture.

Atlanta Brush Co.

Atlanta, Ga.



It **SCRUBS** *Electrically!*

For

Better Work a CLEANER Mill

—at Lower Cost

Men always do **more** and **better** work in clean surroundings. Efficiency tests have proved this. They take better care of their materials. They take pride in turning out faultless work. A clean mill attracts the clean-cut, ambitious man who mixes good fellowship with his work and is never a trouble maker.

Mill cleanliness starts with CLEAN FLOORS and Floors are made clean and kept clean with least trouble and lowest cost by the

FINNELL SYSTEM of Power Scrubbing

This outfit, including Power Scrubber, water absorber and mop truck, keeps your floors spotless at a vast saving over the old inefficient methods of scrubbing and mopping. One textile mill found that Finnell Equipment saved $12,000 a year in wages alone. Furthermore, it pays big profits in 1—better working conditions; 2—cleaner production; 3—less waste and soilage; 4—fewer accidents; 5—healthier and happier employees. There is a profitable size outfit for any size mill. Write for illustrated booklets containing complete information on the dividend-paying FINNELL SYSTEM. No obligation.

AMERICAN SCRUBBING EQUIPMENT CO.

Also makers of Finola Scouring Powder.

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"Clean Floors Reflect Clean Business"

Are your floors CLEAN?

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COTTON LOOM HARNESS

Our customers know that when they send their harness orders to us that the order will receive individual and careful attention—personal interest that results in complete satisfaction and prompt service, *regardless of how small or how large the order.* We are prepared to give you the same personal service in furnishing your loom harness.

We specialize in Harness for Warp Drawing Machines. Write for order book.

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MACHINE CO.

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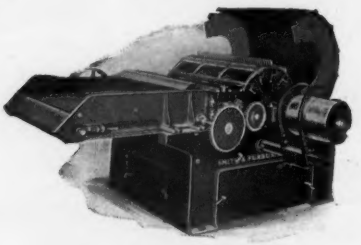
Specialists in machinery for working all kinds of Waste Products. Complete equipment for coarse yarns, etc., from waste. Shoddy, Felting and Woolen machinery.



Jute Picker
Send for Circular S-166

This machine is used for shredding or hackling out Gunny and Burlap bagging.

It is used as a part of our outfit for the manufacture of gunny sacking from scrap bagging.

SAFETY FIRST

O-C Patented Roving Can Indicators provide the best, simplest and most efficient method of avoiding mixed work in the Carding Department. By eliminating painting and the tying of strings, they remove the unsightly conditions which generally result when trying to avoid mixed work. They eliminate the need for an extra supply of cans, thereby allowing all cans to be in use at the same time, avoiding delay.

A trial order will convince you. Sample sent and prices quoted on application.

O'MALLEY & CARROLL

Manufacturers of

Roving Can Indicators

UTICA NEW YORK

AMERICAN

SUPPLY COMPANY

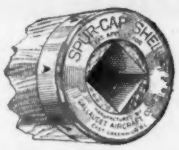
PROVIDENCE, R. I.

MANUFACTURERS OF

Loom Harness,
Weaving Reeds,
Oak Tanned Leather
Belting, Strapping,
Etc.

We make a specialty of Harness for Warp Drawing Machines

NOTE—No orders too large for our capacity. None too small to receive careful attention.



Pat. Applied for

SPUR-CAP SHELLS

Made to Stand the Hard Knocks

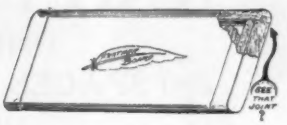
MANUFACTURED BY

GALLAUDET AIRCRAFT CORP'N.,

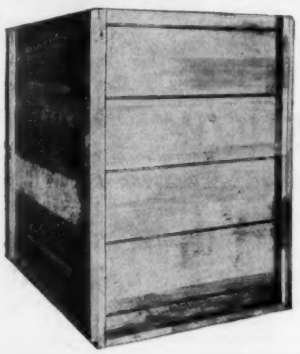
EAST GREENWICH, R. I.

FEATHERBOARD

The Master Cloth Reel



LIGHT AND STRONG. IMPROVES YOUR PUT UP.



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Wooden Packing Cases
ALL STYLES

Manufactured from

GEORGIA PINE POPLAR CYPRESS
WHITE PINE and GUM

Your Inquiry Solicited

Hightower Box & Tank Co.

Corner Humphreys and Glenn Streets,
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The Palmer Adjustable Thread Guide

For Ring Spinning and Twisting Frames

Easily Adjusted.

Extreme accuracy and permanence of setting.

Cheapest of them all.

Mail guide-block for free sample.

Patented and manufactured by

THE I. E. PALMER COMPANY

Middletown, - - - Connecticut

EIGHTY THOUSAND

Automatic looms of all types, including plain looms made automatic, from Maine to Louisiana, now use and endorse the

CLAYTON & BENTLEY

IMPROVED AUTOMATIC

THIN-PLACE PREVENTERS

as the most economical and positive relief from Thin Places available. All interested mills are offered the opportunity of proving the merits of this appliance in their own mills, by testing samples, without expense or any sort of obligation. Simple permission to have an Erector call and equip a few looms for as long a test as you desire is all that we solicit, as the device does its own talking.

Our sales in 1921 exceeded any previous year. The appliance quickly pays for itself—thousands of our first models have been in constant use eight to ten years—have paid for themselves many times over—are still good for many years to come—the upkeep expense being just about NOTHING NET.

Manufactured by

CLAYTON & BENTLEY CO.

88 Stonewall Street, Atlanta, Georgia.

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WOULD BE OF LITTLE VALUE

BUT LOOK—

AFTER THE FIRST OFFICIAL ALLOTMENT OF SPACES FOR THE

KNITTING ARTS EXHIBITION

PHILADELPHIA, MAY 22, 23, 24, 25, 26

200 SPACES WERE ASSIGNED

AND SINCE THAT OFFICIAL MEETING APPLICATIONS FOR

51 ADDITIONAL SPACES

HAVE BEEN APPLIED FOR

251 SPACES CONTRACTED TO DATE

AND THE REASON? IT'S CONFIDENCE IN RETURNING BUSINESS AND BELIEF IN OUR ASSERTION THAT THIS WILL BE A

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If You have not yet Booked Space, Accept Our Suggestion to do so at once.

RESULTS WILL JUSTIFY IT

Under the Personal Direction
CHESTER I. CAMPBELL,
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THE

"Southwestern Iron Clad"

Is the IDEAL Cotton Mill Broom

Only the best grade of broom corn is used in these brooms—they are built strong and will withstand the hardest usage.

The light weight, yet strong and substantial shields used gives the broom ample protection and at the same time allows the proper amount of broom corn to be used, thus giving them excellent sweeping qualities.

MADE RIGHT!
PRICED RIGHT!

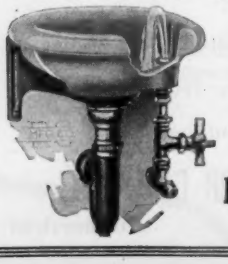
Inquiries and orders receive prompt attention.
Sold direct and through
all principal distributors.

The Southwestern Broom Mfg. Co.
Evansville, Indiana

The

VERTICO-SLANT

Is a practical solution of the drinking fountain problem. with its stream of minimum slant—the stream that cannot be contaminated.
Lips cannot touch the nozzle, which is raised slightly above the sloping base of recess. The copious drinking feature of the vertical stream is retained in the Vertico Slant, as the mouth comes in contact with the stream at a point where it loses its momentum.



Glass or cup can be filled easily from this stream.
The Fountain that prevents squirting, tampering or pilfering, and uses less water than the average old-style globe shaped drinking fountain.

The ideal fountain for hospitals, offices, factories, picnic grounds, etc

Rundle-Spence Mfg. Co.
Milwaukee, Wis.

BREATHE LAUNDERED AIR

Clean, wholesome air, containing the proper proportion of humidity, conditioned to a comfortable temperature is absolutely essential in industrial, office, public and school buildings.

The Bayley Turbo Air Washer

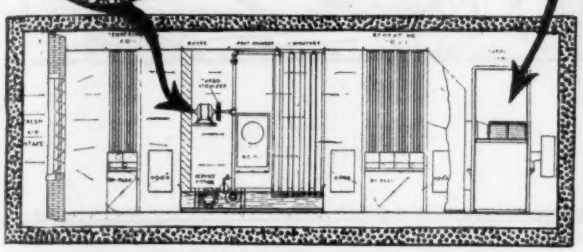
Supplies pure air by passing atmospheric air through a dense water spray to eliminate impurities, and through a conditioning chamber to regulate temperature and humidity. Uninterrupted service is assured by an atomizer that

Will Not Clog

The Turbo-Atomizer (shown in the circle) distributes a fine spray evenly through the spray chamber at low water pressure. Impurities washed out of the air will not clog it, as the smallest water passage is 5/8" in diameter. An ideal unit for replacing fine orifice systems. Also for washing gases.

Send for free bulletins today.

BAYLEY MFG. CO.
Dept. I,
MILWAUKEE, WIS.



A Matter of Economy

The MARTINIQUE
IS GLAD TO ANNOUNCE REDUCED RATES

SOMEONE must take the initiative in making it possible for people to travel and spend less money—now that there is less money to spend.

So, hand in hand with Hotel McAlpin which recently announced its reductions, the Martinique—just across the street and under the same management—becomes a leader in lowering hotel tariff.

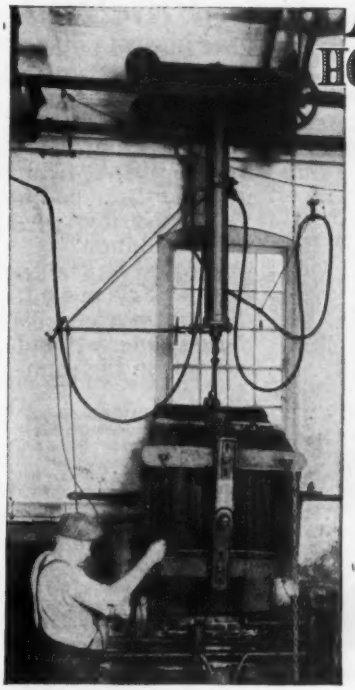
This is setting an advance style, as it were, for there has not been an appreciable reduction in the cost of running a large New York hotel.

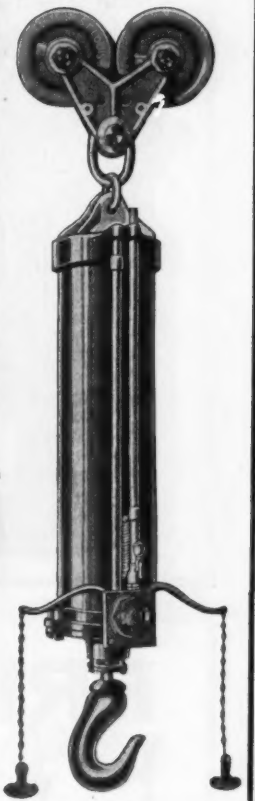
If, however, the public esteems the spirit in which it is done, as much as the management of the McAlpin and Martinique appreciates its patronage, then indeed, is it worth doing.

At the Martinique the new prices are: $3.50 up for rooms and bath; $2.50 for room without bath.

The MARTINIQUE
Broadway, at 32nd St., New York
Frank E. Jago, Resident Manager

CURTIS AIR HOISTS





Used in The Textile Industry

"Lift it with air"

Curtis one man All Steel Air Hoists and Curtis Roller Bearing Trolleys are effecting important economies in leading textile mills throughout the country.

Why not install a Curtis Air Hoist and operate it with the air you now have available? The wide variety of uses to which Curtis equipment can be most economically applied is worthy of your immediate investigation.

Curtis Pneumatic Machinery Co.
1571 Kienlin Ave. St. Louis, Mo.
Branch Office
532-R Hudson Terminal New York

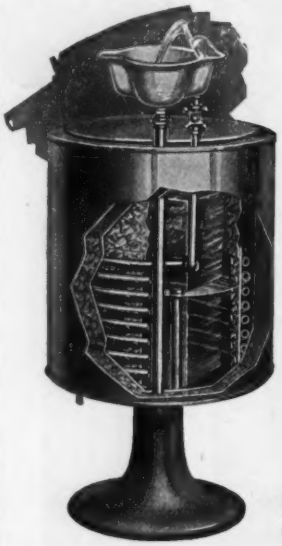
CURTIS
AIR COMPRESSORS-HOISTS-TROLLEYS-CRANES
ST. LOUIS
C.P. Mchy Co.

Established 1854

Puritan
CANTONMENT
DRINKING FOUNTAINS

Sanitary and Practical

Practical drinking mound is formed by mechanical means. Interference is set up in stream which retards water at the apex of arc. This stream makes it impractical to drink from any other point, thus insuring perfect sanitation.



Approved by the U. S. Government. Now recognized by largest interests and schools in the country.

Puritan "Cantonment" Coolers are designed to connect with pressure lines and are so constructed that the drinking water does not come in direct contact with either the ice or ice water, but is circulated through brass coil which is tinned both inside and outside.

Write today for illustrated literature.

Halsey W. Taylor Company
Warren, :: :: :: Ohio

Convenient for quick reference

Catalogs, price lists, rate books and other important reference papers are immediately at hand in the

Kleradesk

They are out of the way in their indexed compartments until wanted. It also sorts and routes mail, memos, orders, etc., for all to whom mail is distributed. Saves time. Efficient. Convenient.

A Steel Sectional Device

Add compartments as required. Sections $1.20 each. Six-compartment Kleradesk illustrated below only $8.40. Indexed front and back. Write for free, instructive, illustrated folder, **"How to Get Greater Desk Efficiency."**

Ross-Gould Co.
318 N. 10th—St. Louis (9)
New York Philadelphia
Chicago Cleveland

PRINTING

WE do it for some of the largest mills in the South—*Why not for yours?*

If our prices and service were not right, we could not do it.

THE A. J. SHOWALTER COMPANY
Dalton, Georgia.

ESTABLISHED 1887

BYRD PRINTING CO.

46-48-50 W. Alabama St. Byrd Building
Atlanta, Ga.

Offers experience, equipment and service to its patrons which are unexcelled by any printing plant in the country. Special forms for factories and mills solicited. Prompt deliveries, splendid service and perfect satisfaction in every detail guaranteed. A trial order will make you a regular customer.

Try Us Once!

Saving at Both Ends

While the prevailing fashion in women's dress offers the most striking example of the double economy, it is not the only case. Mill lighting with Cooper Hewitt Lamps accomplishes a like twofold saving.

In the first place, the Cooper Hewitt Lamp delivers more light from a given quantity of electricity than ordinary electric lamps—and the cost of upkeep—renewals and attention—is less.

Therefore—

Cooper Hewitt Light Costs Less

Then, Cooper Hewitt light enables the eye to do its work easier, quicker and more accurately. And as the hand *follows* the eye, the workman turns out more and better product. So—

Cooper Hewitt Light Increases Production

Cheaper light—greater output; you can't beat the Cooper Hewitt Twins: Economy and Efficiency.

Cooper Hewitt Electric Company

Boston—161 Summer Street
Chicago—618 S Fisher Building
Cincinnati—First National Bank Bldg.
Cleveland—Engineers' Building
Detroit—Ford Building
Hoboken—95 River Street

Hoboken New Jersey
BETTER THAN DAYLIGHT

Los Angeles—Kerns Engineering Corp.
Milwaukee—Security Building
New York—120 Broadway
Philadelphia—Drexel Building
Pittsburgh—Westinghouse Building
St. Louis—Title Guaranty Bldg.
Syracuse—University Building

Stop It

The way to prevent loss of stock and tools by theft is to remove temptation.

Those who are now using this effective and economical barrier to pilfering hands, realize the great saving in stock and tools that is possible when protected

With Knapp Standard Wire Partitions

The ideal partition—made in standard sizes adjustable to any space or condition. Furnished with wicket, gravity or swing doors as required. Erected quickly, changed easily.

Let Us Save You Money on

Window Guards
Skylight Guards
Factory Guards
Factory Fence
Factory Gates
Etc.

Attractive Opportunity for Live Sales Agents

KNAPP FENCE

Send Sketch or Dimensions for Complete Details and Prices.

THE KNAPP FENCE CO., EAST 134th ST., CLEVELAND, OHIO

Cornell Wood Board

Send for Free Book of Interiors

Interiors Like These at Lowest Cost in Years

CORNELL-WOOD-BOARD panels make the most economical walls, ceilings and partitions for mill-housing. The cost is lower than lath and plaster or plaster-board. And Cornell lasts longer than ordinary wallboard because it is made of pure wood fiber, "Triple-Sized" with moisture-proof sizing.

When you consider that manufacturers use Cornell for insulating material, you can well imagine that Cornell walls and partitions give exceptional protection against moisture and variation in temperatures.

These wide, flat panels are easily applied with hammer and nails to the joists and studding, or over brick or damaged plaster. We guarantee this "Triple-Sized" wood board not to warp or buckle if our simple directions are followed.

Cornell comes all primed for painting—"Mill-Primed." This saves the labor and cost of a priming coat. Its "Oatmeal" finish rivals costly wallpaper, yet costs nothing extra. And it takes a perfect spread of paint or calcimine.

CORNELL WOOD PRODUCTS CO., Dept. CO-3
General Offices, 190 North State Street, Chicago, Ill.
Water Power, Mills and Timberlands in Wisconsin

A new use *every day*

Don't Stretch Your Warps on the Slashers !

Stretched, lifeless warps mean poor weaving and less production.

Ball-bearing-equipped truck rollers can be applied to your slashers in an hour without taking the yarn off.

The cylinders will then turn freely, and there will be no danger of stretching the warp.

The cost is very reasonable, and the bearings soon pay for themselves in better slashing.

AldricH MachinE Ball WorkS Bearings
Greenwood, S. C.

VOGEL
PATENTED

Frost Proof Closets

350,000 giving satisfaction. Save Water; Require no Pit; Simple in the extreme. The most durable water closet made. In service winter and summer.

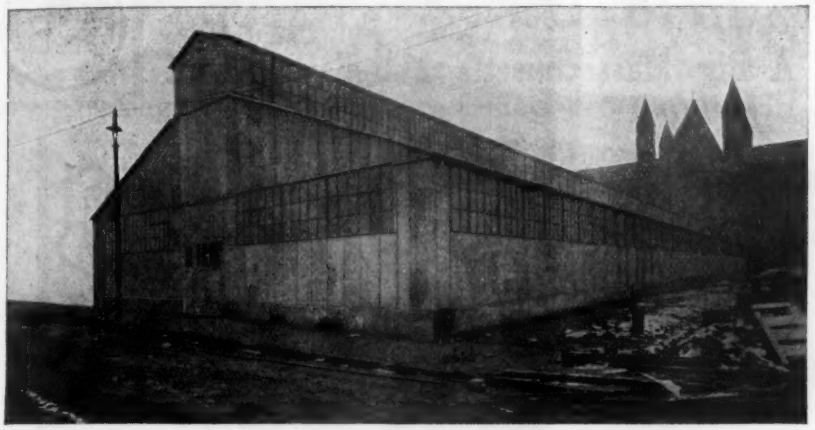
No. 1

- Enameled Roll flushing rim bowls.
- Heavy brass valves.
- Strong hardwood seat.
- Galvanized tank.
- Malleable seat castings will not break.
- Tested under hydraulic pressure before leaving factory.

ASK YOUR JOBBER

JOSEPH A. VOGEL CO.
WILMINGTON
DELAWARE

This Monitor Type Prudential Building was erected in nineteen days. It is a modern "Daylight" Factory Building



The Building You Need at A Decidedly Lower Cost

TRADE MARK BLAW-KNOX REG. U.S. PAT. OFF.

Prudential Galvanized Sectional Steel Buildings illustrate one of those rare instances in which a really meritorious product can be purchased cheaply without sacrifice of quality.

When you specify "PRUDENTIAL," you obtain strength, permanence, long life, portability, attractiveness and all other qualities which go to make buildings desirable. You retain every feature you wish to be present in your new factory, warehouse or other industrial building, and—**SAVE MONEY.**

Write for particulars—all sizes and types

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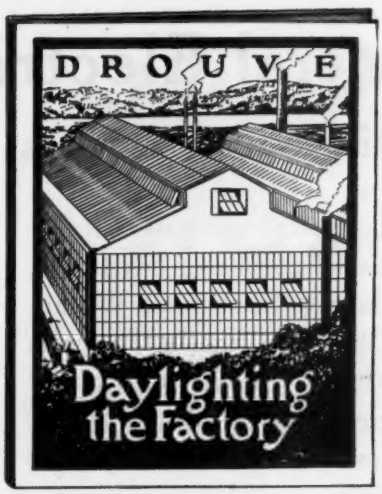
NEW YORK BOSTON BALTIMORE BIRMINGHAM CHICAGO DETROIT SAN FRANCISCO LONDON, ENG.

PRUDENTIAL
STEEL BUILDINGS SECTIONAL



Look Into It!

Perfect lighting of the mill interior is today, more than ever, an economic necessity, and of all lighting, natural daylight is the best and cheapest.

If you are contemplating changes in your mill, new additions or a new mill construction, look into the matter of skylights. This interesting booklet tells how skylight roofs can be made as substantial as any other roofs, how glass breakage has been eliminated and corrosion prevented, how better lighting and more perfect ventilation is assured, illustrating many installations, and containing other data of value to the mill man.

A copy should be in every mill man's file. Write for your free copy today.

THE G. DROUVE CO.

BRIDGEPORT, CONNECTICUT

A Coat of ZEMCO-LITE IS A Coat of CEMENT—

Textile mills of today want a paint that will give lasting satisfaction—a paint that will not discolor—a paint that will properly diffuse the light—a paint that sticks and stays—a paint that will not crack, peel or blister and is unaffected by climatic conditions.
Such satisfaction is found in

Zemco-lite

TRADE MARK

The "Cement Paint"

"ZEMCO-LITE" is a compound of pure WHITE Portland Cement reprocessed with suitable minerals, put up in dry powder form, mixed with water when applied. It **cements itself** to the surface of brick, iron, wood, steel, plaster, stucco or cement, and renders a weather-proof fire-resisting pure white, and sanitary wall.
Its cost is but a fraction of that of oil paint—but is considerably more durable.

Write for full particulars about our exterior and interior paints.

American Cement Paint Co.

Chattanooga, Tenn.

Read What A Big Massachusetts Mill Says About

Fabreeka Belting

"The leather belt has been taken up six times while the Fabreeka belt has never been touched. Speed of the machines has been checked up several times and while that of the machine driven with leather has varied greatly, necessitating the taking up of the belt, the speed of the machine driven with Fabreeka has never changed."

The above is an excerpt from a letter from a big Massachusetts Mill, after having put a first grade heavy single leather belt on one pulley, and a heavy single Fabreeka belt on the other pulley, on the same side of the motor of a spinning frame. After running two months the above report was made.

We are constantly receiving such letters testifying to the superior performance of "FABREEKA" belting over leather belting.

"FABREEKA" has greater tensile strength than leather, with long wearing life under the most strenuous conditions. Will not stretch or shrink. Runs absolutely true on pulleys without vibration. Its pliability and strength on high speed small pulleys is its guarantee.

Impervious to steam, acid fumes, water, heat, etc.

Write for full particulars and prices.

Fabreeka Belting Company

30 India Street **Boston, Mass.**

DON'T SPOIL GOODS WITH OIL

The Lidseen Textile Oiler is safe; only a few drops at a time. We can help you with this Trouble.

½ Pt. 4" Spout

Ask me for further information.

J. S. HULME,
So. Representative,
Atlantic Trust Bldg.
ATLANTA, GA.

LIDSEEN
832-840 So. Central Ave.,
CHICAGO

General Electric

Distributing Jobbers

Complete lines of Rubber Conduit Wire, Switches, Safety Switches, Wiring Devices, Fuses, Edison Mazda Lamps and other electrical materials carried in our Atlanta and Savannah warehouses ready for immediate shipment.

Quick Service

Carter Electric Co.

Atlanta, Ga.

Established 1854 *Incorporated 1898*

THE A. & F. BROWN CO.

ENGINEERS, FOUNDERS AND MACHINISTS

Engineering and Sales Office, 79 Barclay Street, New York

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Elizabethport, N. J.

POWER TRANSMISSION SPECIALISTS

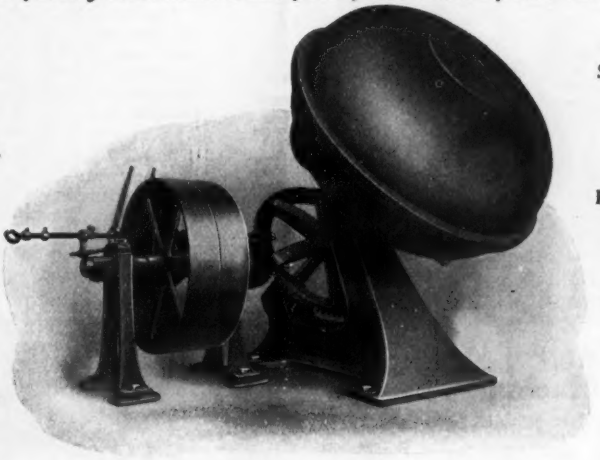
Stock Room in
New York City

Economy is where quality determines the price, not where price controls the quality

GEARS
MACHINE MOULDED
3″ TO 16 FT. DIA.

PLANED BEVEL
UP TO 48″ DIA.

CUT SPUR
UP TO 96″ DIA.



SHAFTING (Turned Steel)
PULLEYS
HANGERS
FRICTION CLUTCHES for
COUPLINGS,
PULLEYS,
GEARS,
SPROCKETS,
ETC.

Ball Color Mixer

Nine Sizes— 18, 24, 30, 36, 42, 48, 54, 72, 96 inches.

For mixing and secondary grinding of Colors, Chemicals, etc.

DEPENDABLE—ALWAYS
D-A
Lubricant

"Clings to Metal"

A WELL KNOWN MILL MAN ONCE SAID: "When I was a kid the only way they could get me to take a capsule was to hide it in a spoonful of jelly. But when I swallowed the jelly I always felt the capsule.

Most lubricants sold to cotton mills are covered with jelly, too. They are very light in color and are represented to be stainless. THE COLOR IS THE JELLY. The result is the capsule.

There is no oil or grease with the proper lubricating value that will not stain. The lighter its color, the dirtier and darker it gets when in use and in contact with metal. Frequently the lighter its color, the lighter its lubricating value, the less its heat and friction resisting qualities.

To cling to metal, an oil must have body. To have body it must be a NATURAL OIL, an oil of the same undisturbed elements as Nature produced it for lubricating purposes, not an oil that has been bleached and diluted with artificial fillers and binders to make it look harmless.

D-A LUBRICANT IS PURELY A DENSIFIED, MINERAL OIL

It is made by taking the finest grade of Pennsylvania Paraffine base refined oil and treating it by our special process. The process is entirely a cold one. The lubricating properties of the oil are CONCENTRATED. Its clinging qualities to metal are intensified. Its resistance to heat, caused by friction or direct contact is increased 400%.

While its color is dark, it is absolutely pure and harmless. Harmless because it clings to metal, will not stain yarn or cloth, because when properly applied it will not thin down and throw off. When in actual use and in contact with metal, its color lightens almost to that of a light cylinder oil. THIS IS BECAUSE IT IS PURE. It has no fillers or binders or acids frequently used to disguise the staining properties of oil.

IT NEVER LEAVES ANY GUM OR RESIDUE

IT IS ECONOMICAL, because: It keeps gears, cams and bearings clean and oily. It lessens power consumption. Its life is from 6 to 8 times longer than any other cotton mill lubricant. It saves labor and lessens the chances of ruining the cloth by reducing the number of oil applications. It increases the life of gears, cams and bearings.

The foregoing statements are based solely on the experience of hundreds of cotton mills who are using D-A Lubricant in the following places:

Loom Cams, Pedals, Pick Cams and Balls; Head Gears; Slasher Bearings and Gears; Spinning Frame Gears and Bearings; Picker Gears and Bearings; Foster and Universal Winder Cams; Ball Bearings; Chain Drives; Elevators; Water and Humidifier Pumps.

Packed in Barrels, Half-Barrels and 50-Pound Cans

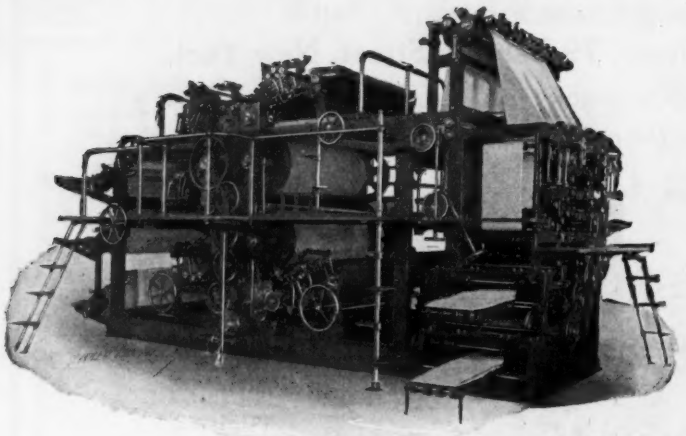
D-A Lubricant Company, Inc., Indianapolis, Ind.

Southern Representative.
John K. Gewinner,
33 Luckie St., Atlanta, Ga.

New England Representative:
MacNichol-Crosby Co.
Little Bldg., Boston, Mass.

Chicago Representative:
W. D. Hudson & Sons
180 N. Wabash Ave.

THE JOHNSON FRICTION CLUTCH



Courtesy of C. B. Cottrell & Sons Co., Westerly, R. I.

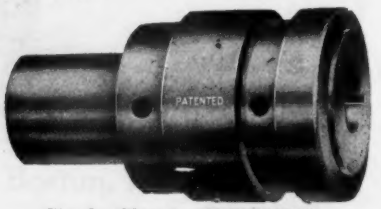
Friction Control on the Cottrell Printing Press

The Johnson Clutch is used to drive the rollers on this big rotary web printing press. It has been supplied as standard equipment on these machines for the last twelve years, and by its perfect performance and dependable service has contributed a great deal to the successful operation of the Cottrell Press.

A good friction clutch is much in demand on printing machines, and most of the leading manufacturers in this line are using Johnson Clutches. They have found that a Johnson Clutch drive brings out the highest degree of efficiency from a machine, and insures maximum of service.

Friction Control Means Better Machinery

Johnson Clutches not only offer the finest type of clutch construction, but they are supported by an experienced engineering department, competent to determine the correct clutch arrangement for any conditions. We are always pleased to confer on any problems pertaining to the application of friction control on Textile machinery.



Single Clutch—EXTERIOR

Write for our Catalogue "G"

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN.

CRESSON-MORRIS CO.

POWER TRANSMITTING MACHINERY

Merit Plus Recognition

"The heights by great men reached and kept were not attained by sudden flight."

Time, skill and effort must also precede merit as surely in machinery as in men.

Time, skill and effort must also precede merit in order to obtain and maintain for merit the recognition it deserves.

The great number of large installations of Cresson-Morris Power Transmitting Machinery is proof of both the merit and the recognition of the merit that nearly three score years of skill and effort hove endowed it with.

The cumulative knowledge of all this experience is always available to you in the recommendations of our engineers.

CRESSON-MORRIS COMPANY

ENGINEERS—FOUNDERS—MAHINISTS

PHILADELPHIA, PENNA.

Branch Office. 141 Milk St., Boston, Mass.

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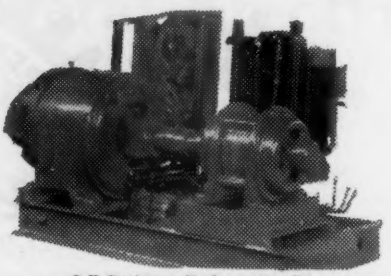

G-E Stationary Single-operator Set

Electric Welding Saves Time, Space and Money

It economizes time because it accomplishes an immediate fusion—it saves space, because it is compact and there are no cumbersome oxygen cylinders—it saves money because it accomplishes the desired results with the greatest facility and with absolute permanence of weld, because it is a one-man machine, and because there are no freight charges and expense of purchasing oxygen.

The G.E. Arc Welding Set has been thoroughly tested and is now in constant use in mill machine shops, and in other industries which require speedy and perfect welding of iron or steel. The repair of the smallest crack, the union of large metallic surfaces, the rebuilding of worn parts are accomplished with actual facility and thoroughness.

After May 10, 1922, we will handle full line of oxy-acetylene supplies. New and fresh stock of quality goods of all kinds.

Made in stationary and portable models.
Write for full information and prices.

George Bird Bruce Potts

WELDING ENGINEERS

BIRD-POTTS COMPANY

WELDING Incorporated **BUILDING**

376-378 MARIETTA ST., ATLANTA, GA.

— SOMETHING NEW

At last!—a fool proof renewable fuse plug

Expensive motors and apparatus must be guarded. Dependability and accuracy are absolutely necessary. This fuse plug is absolutely foolproof. A simple unit —only three parts—takes but a few seconds to remove the blown element and replace it—no tools required. And, you know that it will function when it should. The powder-packed renewable cartridge eliminates all possibilities of fire on short circuit Will withstand more blowouts than any other fuse plug on the market. No porcelain to break.

A remarkable new invention having all the safety, dependable and economical features of the famous **FEDERAL RENEWABLE FUSES** and the **FEDERAL-NATIONAL MULTIPHASE TIME LIMIT RENEWABLE FUSES.**

FEDERAL

"THREE-THIRTY"

TIME LIMIT·POWDER PACKED

RENEWABLE FUSE PLUG

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Federal Sign System (Electric)

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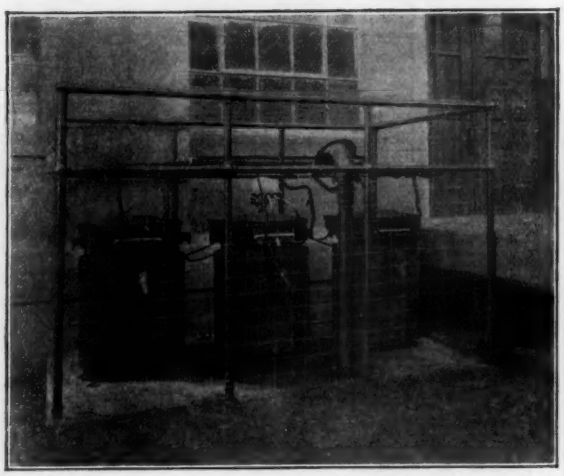
SAN FRANCISCO, CAL.

Branches in all large cities



Distribution Transformers

An Installation of Allis-Chalmers Distribution Transformers in the economical distribution of Power in a large Southern Cotton Mill.

Transformers are built in all sizes for any voltage, both 60 and 25 cycle.

ALLIS-CHALMERS PRODUCTS
Electrical Machinery
Steam Turbines
Steam Engines
Gas and Oil Engines
Hydraulic Turbines
Crushing and Cement Machinery
Mining Machinery

ALLIS-CHALMERS MANUFACTURING COMPANY

MILWAUKEE, WISCONSIN. U.S.A.

ALLIS-CHALMERS PRODUCTS
Flour and Saw Mill Machinery
Power Transmission Machinery
Pumping Engines-Centrifugal Pumps
Steam and Electric Hoists
Air Compressors - Air Brakes
Agricultural Machinery
Condensers

Think Of The Loss

Great losses are sustained by cotton mills throughout the country each year by throwing machinery parts in the scrap heap instead of welding them.

A certain cotton mill, in six months' time made 125 broken crankshafts as good as new with their STANDARD welding apparatus, at costs of less than $2.00 each. What would 125 new crankshafts have cost them?

The welded crankshafts are giving just as good or perhaps even better service than new ones, and just goes to prove that every cotton mill is not fully equipped without a

Standard Welding and Cutting Machine

We not only supply the machine, oxygen and supplies, but we send experts to your mill and teach your mechanics how to use it. If you have a breakdown too large for your own mechanic, our experts are always ready to come to you quickly.

Write for catalog and price list.

STANDARD GAS PRODUCTSCO., Inc.

Oxygen, Oxy-Acetylene Welding and Cutting Machines and supplies,

Main Office, Atlanta, Ga.

Gretna, La. Chattanooga, Tenn.

TRADE JENKINS MARK Jenkins Bros

Economy that endures

Consider the cost of a valve by the service it gives, for it is the valve that gives dependability for the longest time that proves most economical.

A valve to be good and satisfactory under all conditions must be strong enough, and made for maximum service, not merely the average—Jenkins Valves are such valves.

Know the genuine by the Jenkins "Diamond" and Signature

JENKINS BROS.

New York . Boston . Philadelphia . Chicago
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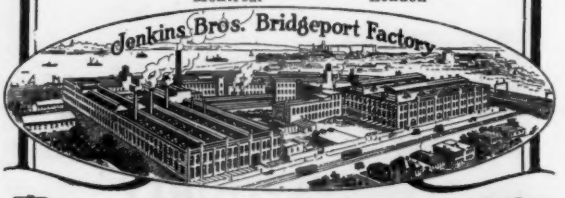

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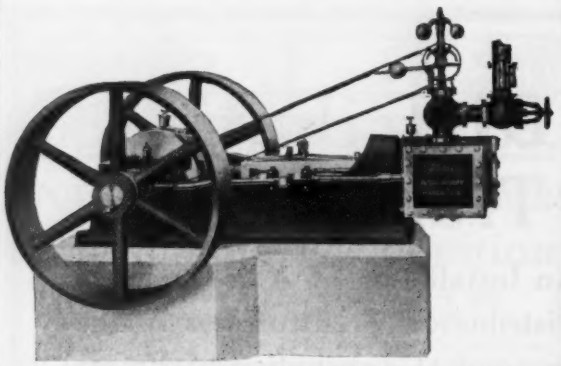

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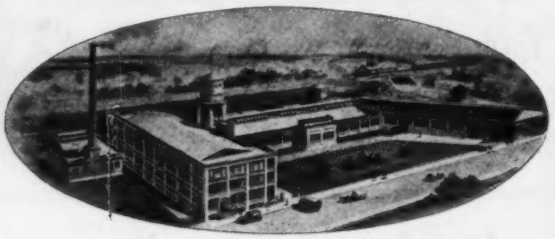

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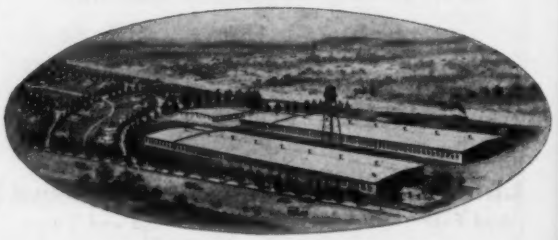

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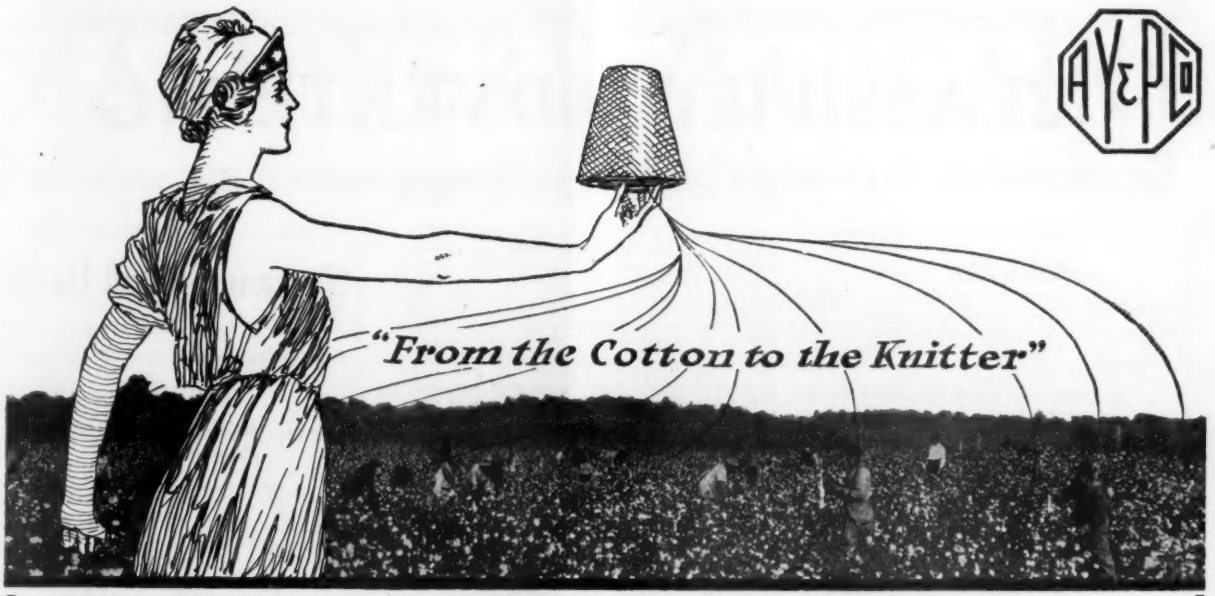

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104 ROOMS AND BATH	2.50	4.00
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Young man 26 years of age desires position, either clerical or technical. Fourteen years mill experience. Textile college student and also I. C. S. Textile student. Stenographer, capable of doing general office work. Salary no object if position offers a future. Address Box 47, care COTTON, Atlanta, Ga.

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Salesman acquainted with buyers and who can obtain orders for sales and order books, can make favorable commission arrangements with leading Chicago concern in this line. Chicago Sales Book Co., 337 W. Madison St., Chicago.

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75 Rooms at $2.50 a day
100 Rooms at $3.00 a day
100 Rooms at $3.50 a day
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Excellent Cuisine, Moderate Priced Restaurant, Popular Cafeteria. Write or Wire for Reservations.

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600 ROOMS - 600 BATHS

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Detroit Transportation Club

100 at $2.50 Single — $4.50 Double, per Day
150 " $3.00 " — $5.00 " " "
100 " $4.00 " — $6.00 " " "
50 " $5.00 " — $7.00 " " "
50 with Twin Beds, $5.00 to $7.00 " "
100 In Suite, $5.00 to $8.00, Double " "

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Special Bulletins covering various kinds of equipment will be sent on request.

A few of the many offerings:

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8—14-in. Worthington Class B, double suction, 8500 G.P.M. at 152 ft. head, at 1170 R.P.M., direct connected to 300 hp. G.E., 3 phase, 60 cycle, 2200 volt motors.

4—14-in. Allis-Chalmers, Type S, 7500 G.P.M. at 130 ft. heat at 1760 R.P.M., direct connected to 300 h.p. General Electric, 3 phase, 60 cycle, 2200 volt motors.

2—10-in. Allis-Chalmers, Type S, 3750 G.P.M. at 130-ft. head at 1765 R.P.M., direct connected to 150 h.p. Westinghouse 3 phase, 60 cycle, 2200 volt motors.

6—16-in. Allis-Chalmers, Type S, 8500 G.P.M. at 90-ft. head, direct connected to Type L, 300 h.p., 2000 R.P.M. G.E. Curtis steam turbine.

6—14-in. Allis-Chalmers, Type S, 6500 G.P.M. at 150-ft. head, 8100 G.P.M. at 90-ft. head, direct connected to 300 h.p. 2000 R.P.M. G.E. Curtis steam turbine.

1—20 x 12 x 16 Worthington duplex Underwriters fire pump, 1500 G.P.M., 100 lb. pressure.

200—New and used simplex and duplex, steam driven, Worthington pumps, 4½x3¾x4, 5½x4¾x5, 6x4x6, 7½x4½x10, 6x2½x6.

100—New and used belted 2½", 3", 5", 5", and 6" centrifugal pumps.

Bulletin No. 8 gives complete specifications of all Pumps.

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10—18-in Buffalo Electric Disc Exhaust Fans.
6—24-in. Buffalo Electric Disc Exhaust Fans, Emerson Motors.
28—24-in. Buffalo Electric Disc Exhaust Fans, E. S. C. Motors.
64—30-in. Buffalo Electric Disc Exhaust Fans, Emerson Motors.
18—30-in. Buffalo Electric Exhaust Fans, Sprague Motors.
5—No. 1 Buffalo Baby Conoidal Fans, Emerson Motors.
4—No. 2 Buffalo Baby Conoidal Fans, Emerson Motors.
4—No. 3 Buffalo Baby Conoidal Fans, Emerson Motors.
15—No. 4 Buffalo Baby Conoidal Fans, Emerson Motors.
All the above equipped with standard A.C. Motors.

BLOWERS—continued.

5—No. 3 Buffalo Niagara Conoidal Fans.
10—No. 4½ Buffalo Niagara Conoidal Fans.
25—No. 6 Buffalo Niagara Conoidal Fans.
15—No. 7 Buffalo Niagara Conoidal Fans.
1—No. 9 Buffalo Niagara Conoidal Fan.
10—No. 4 Buffalo "B" Volume Blowers.
5—No. 5 Buffalo "B" Volume Blowers.
2—No. 6 Buffalo "B" Volume Blowers.
5—No. 8 Buffalo "B" Volume Blowers.
10—No. 1 Low Pressure Gas Exhausters.
10—30-in. Buffalo Standard Reversible Mill Exhausters.
25—50-in. Buffalo Standard Reversible Mill Exhausters.
10—No. 4 24-in. Buffalo Steel Pressure Blowers.
7—Roots Style D, High Pressure Type Blowers, capacity 890 cu. ft. per minute.
2—Connersville Blowers, capacity 3,200 cu. ft. per minute.
Write for Bulletin No. 11 giving complete specifications.

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Thousands of pulleys, including pressed steel, split cast iron and solid cast iron, ranging in diameter from 6 to 56 inches, and in width from 2 to 32 inches, are included with the material at Old Hickory.

Also hundreds of tons of cold rolled shafting up to six inches in diameter, pillow blocks, drop hangers, ring-oiling, capillary and standard bearings, flange couplings, ribbed couplings, grim death couplings, wall brackets, floor stands, pillow block frames, friction clutches, cut-off couplings, sleeves, collars, etc.

We can supply complete line shafts or any transmission equipment needed. Write for Bulletin No. 15.

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1500—New and used steel Tanks, small sizes. Mixing tanks, storage tanks, boiling tanks, pressure tanks, and open tanks.
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Southern Spindle & Flyer Co.
Whitin Machine Works.

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Schofield Co., Wm.
Smith & Furbush Mach. Co.
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(See Aprons.)

CARRIER SYSTEM.
Curtis Pneumatic Machinery Co.

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(See Boxes.)

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Cresson-Morris Co.
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Sanymetal Products Co.
Southern Theatre Equip. Co.

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Electro Bleaching Gas Co.

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Philadelphia Felt Co.

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Wildman Mfg. Co.

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Clayton & Bentley Co.
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Scott & Co., Henry L.
Textile Finishing Mchry. Co.
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Reliance Machine Works.
Tolhurst Mch. Wks.

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Scott & Co., Henry L.

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Cresson-Morris Co.
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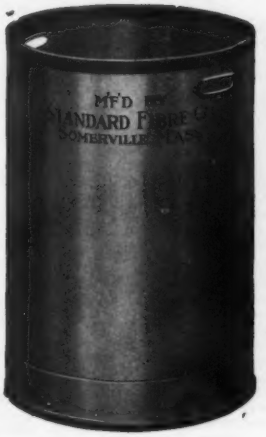

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Blaw-Knox Co.

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(See Architects and Engineers.)

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Spiker & Lose.
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(See Hum'difying Apparatus.)

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(See Water Coolers.)

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(See Scales.)

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(See Cars.)

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(See Fountains—Drinking.)

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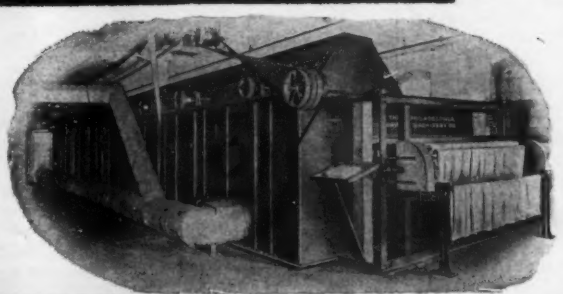

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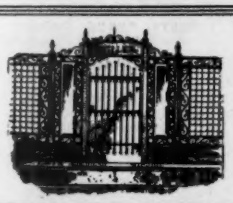

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BUYERS' INDEX—Continued.

GEAR PULLERS.
General Electric Co.

GENERATORS—ELECTRIC.
(See Motors and Generators.)

GLASSWARE AND DISHES.
(See Dishes.)

GLASS SKYLIGHTS.
Drouve Co., G.

GOVERNORS—PUMP.
General Electric Co.

GRAPHITE.
Dixon Crucible Co., Jos.

GRATES—BOILER.
Cole Mfg. Co., R. D.
International Eng. Works.
Lombard Fdry. & Mch. Co.
Walsh & Weidner Boiler Co.

GRATES—MECHANICAL.
(See Stokers.)

GREASE.
(See Lubricants.)

GREASE CUPS.
(See Lubricators.)

GRINDERS—CARD, CYLINDER, ROLL, NAPPER AND GARNET.
(See Card Grinding Machinery)

GUARDS—ELECTRIC LAMP.
(See Electric Lamp Guards.)

GUARDS—MACHINE, SKYLIGHT, WINDOW, ETC.
Knapp Fence Co.

GUIDES—THREAD.
Palmer Co., I. E.

GUIDER—CLOTH-ELECTRIC.
Blake Electric Mfg. Co.

GUMS.
(See Finishing and Sizing Materials.)

HANGERS.
(See Shafting and Hangers.)

HARDWARE—BUILDING.
Sanymetal Products Co.

HARNESS—LOOM.
American Supply Co.
Atlanta Harness & Reed Mfg. Co.
Crompton & Knowles Loom Works.
Emmons Loom Harness Co.
Greist Mfg. Co.
Garland Mfg. Co.

HEADS—BOBBIN AND SPOOL.
Lestershire Spool & Mfg. Co.

HEATERS.
Bayley Mfg. Co.

HEATING AND VENTILATING APPARATUS.
(See Ventilating Apparatus.)

HEDDLES.
Crompton & Knowles Loom Works.
Draper Corporation.
Steel Heddle Mfg. Co.

HEDDLE FRAMES.
Crompton & Knowles Loom Works.
Steel Heddle Mfg. Co.

HOISTS.
Curtis Pneumatic Mchry. Co.
Link-Belt Company.
Morse Chain Co.
Walraven Co.

HOPPER FEEDERS.
(See Automatic Feeders.)

HOSE—FIRE.
Collins, J. D.
Walraven Co.

HOSIERY DYEING MACHINERY.
Cocker Mch. & Fdry. Co.
Cole Mfg. Co., R. D.
Franklin Process Co.

HOSIERY FORMS.
(See Drying Forms.)

HOSIERY YARNS.
(See Yarn Manufacturers.)

HOSPITAL EQUIPMENT AND SUPPLIES.
Estes Surgical Supply Co.

HOTELS.
Hotel Cecil.
Hotel Claridge.
Hotel Martinique.
Hotel Sinton.
Hotel Tuller.

HOUSES—STEEL.
Blaw-Knox Co.

HUMIDIFYING APPARATUS.
American Moistening Co.
Bayley Mfg. Co.
Carrier Eng. Corp.
Manufacturers Machine Co.
Parks-Cramer Co.

HUMIDITY INDICATING INSTRUMENTS.
Powers Regulator Co.

HYDROMETERS.
Taylor Instrument Co.

HYDRODEIKS.
Taylor Instrument Co.

HYDRAULIC TURBINES.
(See Turbines—Hydraulic.)

HYDRO EXTRACTORS.
(See Extractors.)

ICE MACHINES.
Miles Refrigerating Co.
Southern Ice Machine Co.

ILLUMINATING ENGINEERS.
Cooper Hewitt Electric Co.
Curtis, Paul W.
Huntington & Guerry.
Ivanhoe-Regent Works.

INDICATING AND RECORDING INSTRUMENTS AND THERMOMETERS.
Foxboro Co., Inc.
General Electric Co.
Powers Regulator Co.
Taylor Instrument Co.

INDIGO.
(See Dyestuffs and Chemicals.)

INDICATORS FOR ROVING CANS.
O'Malley & Carroll.

INDUSTRIAL SITES.
Nashville Industrial Corp.

INJECTORS.
Lunkenheimer Co.

INK—STENCIL AND MARKING.
Atlanta Stamp & Stencil Wks.
Bradley Mfg. Co., A. J.

IRON WORK—ORNAMENTAL.
Anchor Post Iron Works.
Dufur & Co.
Lombard Iron Works & Supply Co.

JACK SPOOLS.
(See Spools.)

JACQUARDS.
Crompton & Knowles Loom Works.

JOINT COMPOUND.
Dixon Crucible Co., Jos.

JUTE BAGGING MACHINE.
Smith & Furbush Machine Co.

KETTLES—SIZE.
(See Size Kettles.)

KETTLES—SODA.
Lombard Iron Works & Supply Co.

KIERS.
(See Bleaching Kiers.)

KNIT GOODS.
(See Cotton Cloth Commission Merchants and Dealers.)

KNIT GOODS WASHERS.
(See Washers—Cloth.)

KNITTING MACHINERY AND SUPPLIES.
Brinton Co., H.
General Machine Works.
Memphill Mfg. Co.
Markem Machine Co.
Scott & Williams.
Trump Bros. Machine Co.
Wildman Mfg. Co.

LABORATORY INSTRUMENTS AND THERMOMETERS.
Estes Surgical Supply Co.
Taylor Instrument Co.

LACING—BELT.
(See Belt Lacing.)

LAMPS—INCANDESCENT AND ARC.
Bryan Electric Co.
Carter Electric Co.
Cooper Hewitt Electric Co.
Curtis, Paul W.
Cutter Works, George.
General Electric Co.
Ivanhoe-Regent Works of G. E. Co.
Walraven Co.
Westinghouse Elec. & Mfg. Co.

LAMP GUARDS—KEY LOCKING.
(See Electric Lamp Guards.)

LAMP REFLECTORS.
Bryan Electric Co.
Carter Electric Co.
Cooper Hewitt Electric Co.
Curtis, Paul W.
Cutter Works, George.
Ivanhoe-Regent Works of G. E. Co.
Westinghouse Elec. & Mfg. Co.

LANDSCAPE ARCHITECTS.
(See Village Architects.)

LAPPERS.
Brooks & Doxey, Ltd.
Lord Bros.
Saco-Lowell Shops.
Smith & Furbush Mch. Co.
Whitin Machine Works.

LAUNDRY MACHINERY.
American Laundry Mchry. Co.
Fletcher Works.
Hunt Machine Co., Rodney.
Schaum & Uhlinger.
Tolhurst Machine Works.

LAVATORIES.
Crane Co.
Vogel Co., Jos. A.

LEATHER BELTING.
(See Belting.)

LEATHER SPECIALTIES.
American Supply Co.
Williams & Sons, I. B.

LIGHTS—FLOOD.
Cooper Hewitt Electric Co.
Cutter Works, George.
General Electric Co.
Ivanhoe-Regent Works.
Westinghouse Elec. & Mfg. Co.

LIGHTING ENGINEERS AND CONTRACTORS.
(See Illuminating Engineers.)

LINEN YARNS.
(See Yarns—Linen.)

LINK BELTING.
(See Belting—Link.)

LINTERS.
(See Waste Dealers.)

LIQUID CHLORINE.
(See Chlorine.)

LOADERS—WAGON AND TRUCK.
Link-Belt Company.

LOCKERS—METAL.
Collins, J. D.
Lupton Sons Co., David.
Sanymetal Products Co.

LOGWOOD EXTRACT.
(See Dyestuffs and Chemicals.)

LOOMS.
Crompton & Knowles Loom Works.
Draper Corporation.
Fletcher Works.
Saco-Lowell Shops.
Schaum & Uhlinger.
Stafford Co.

LOOM ATTACHMENTS—AUTOMATIC.
Clayton & Bentley Co.
Draper Corporation.

LOOM HARNESS.
(See Harness.)

LUBRICANTS.
D-A Lubricant Co.
Dixon Crucible Co., Jos.
Masury-Young Co.
Moore Oil Refining Co.
N. Y. & N. J. Lubricant Co.
Swan & Finch Co.

LUBRICATORS.
Bowser & Co., S. F.
Lidseen.
Lunkenheimer Co.
N. Y. & N. J. Lubricant Co.

LUG STRAPS.
(See Straps—Lug.)

LUMBER.
Cornell Wood Products Co.
Southern Cypress Mfg. Asso.
Southern Wood Preserving Co.

LUNCH ROOM EQUIPMENT.
(See Restaurant.)

MACHINE TOOLS.
(See Tools.)

MACHINISTS.
Cole Mfg. Co., R. D.
Cresson-Morris Co.
Lombard Fdry. & Mch. Works.

MARKING MACHINES.
Markem Machine Co.

MARKING POTS, STENCILS, INKS, ETC.
Atlanta Stamp & Stencil Wks.
Bradley Mfg. Co., A. J.

MERCERIZED YARNS.
(See Yarn Manufacturers).

MERCERIZERS.
Aberfoyle Mfg. Co.
Amer. Yarn & Processing Co.
Boger & Crawford.
Dixie Mercerizing Co.

MERCERIZED YARN.
Aberfoyle Mfg. Co.
American Yarn & Pro. Co.
Boger & Crawford Co.
Dixie Mercerizing Co.

MERCERIZING MACHINERY.
Butterworth, H. W. & Sons Co.
Textile Finishing Machinery Co.

METAL CEILINGS, ETC.
Lupton's Sons Co., David.

METALS—PERFORATED.
(See Screens and Sieves.)

METAL WORKERS—SHEET.
Cole Mfg. Co., R. D.
Lombard Iron Works & Supply Co.

METERS—FLOW, AIR, GAS, ELECTRIC, STEAM, ETC.
Allis-Chalmers Mfg. Co.
Bryan Electric Co.
Carter Electric Co.
Foxboro Co., Inc.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

METERS—COUNTING.
(See Counters.)

MILL BASKETS AND BOXES.
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MILL ENGINEER.
(See Architects and Engineers.)

MILL VILLAGES.
(See Villages.)

MILL SUPPLIES—MISCELLANEOUS.
(See Supplies—Mill.)

MILL WHITE PAINT.
(See Paint.)

MOPS.
Atanta Brush Co.
Harris Broom Co.
Southwestern Broom Mfg. Co.

MOTION PICTURES.
(See Films.)

MOTORS AND GENERATORS—ELECTRIC.
Allis-Chalmers Mfg. Co.
Bryan Electric Co.
Carter Electric Co.
Curtis, Paul W.
General Electric Co.
Nashville Industrial Corp.
Walraven Co., The.
Westinghouse Elec. & Mfg. Co.

MUSICAL INSTRUMENTS AND SUPPLIES.
Cable Piano Co.

MOVING PICTURE MCH. AND SUPPLIES.
(See Theatre Equipment or Films).

NAPPERS.
Roy & Son Co., B. S.

OFFICE PARTITIONS.
Lupton's Sons Co., David.
Sanymetal Products Co.

OIL—LUBRICATING.
D-A Lubricant Co.
Johnson & Co., Inc., Oliver.
Masury-Young Co.
Moore Oil Refining Co.
Wadsworth, Howland & Co., Inc.

OILS—FINISHING.
(See Finishing and Sizing Materials.)

OIL CANS.
Lidseen.

OIL CUPS.
(See Lubricators.)

OIL PAPER.
Bradley Mfg. Co., A. J.

OIL STORAGE TANKS AND PUMPS.
Bowser & Co., S. F.

OILING DEVICES.
(See Lubricators.)

OPENERS FOR COTTON, WOOL, WASTE, ETC.
Brooks & Doxey, Ltd.
Lord Bros.
Saco-Lowell Shops.
Schofield Co., Wm.
Smith & Furbush Mach. Co.
Whitin Machine Works.

OVERHEAD CARRIERS.
Curtis Pneumatic Mchry. Co.

OXIDIZING MACHINERY.
Cocker Mch. & Fdry. Co.
Phila. Drying Machinery Co.

OXYGEN.
Commercial Acetylene Supply Co.
Oxweld Acetylene Co.
Standard Gas Products Co.

PACKING BOXES AND CASES—WOODEN.
Hauser-Stander Tank Co.
Hightower Box & Tank Co.
Lewis Co., G. B.
Wake Box Co., Inc.

PACKINGS.
Jenkins Bros.
Walraven Co.

PAINT.
American Cement Paint Co.
American Roofing & Paint Co.
Barrett Co., The.
Dixon Crucible Co., Jos.
Du Pont de Nemours & Co., E. I.
Johnson & Co., Oliver.
Wadsworth, Howland & Co., Inc.

PAINTING CONTRACTORS.
(See Contractors.)

PANEL BOARDS.
(See Switchboards.)

PAPER.
Bradley Mfg. Co., A. J.

PARTITIONS—STEEL AND WIRE.
Knapp Fence Co.
Lupton's Sons Co., David.
Sanymetal Products Co.

PERFORATED METAL.
(See Screens and Sieves.)

PEROXIDES.
Roessler & Hasslacher Chemical Co.

PIANO & PLAYERS.
Cable Piano Co.

PICKERS—CURLED HAIR.
Schofield Co., Wm.
Smith & Furbush Machine Co.

PICKERS—LEATHER.
Garland Mfg. Co.

PICKER STICKS.
Garland Mfg. Co.
Southern Bending Co.
Shambow Shuttle Co.
Walraven Co.
Walraven Co.

PICKING MACHINERY.
Brooks & Doxey, Ltd.
Howard & Bullough Am. Machine Co.
Lord Bros.
Saco-Lowell Shops.
Schofield Co., Wm.
Smith & Furbush Mach. Co.
Whitin Machine Works.

PINIONS.
General Electric Co.

PIPE AND PIPE FITTINGS.
Crane Co.
East Jersey Pipe Co.
Parks-Cramer Co.
Scaife & Sons Co., Wm. B.
Walraven Co.

PIPE DRAINAGE.
Dixie Culvert & Metal Co.

PIPE JOINT COMPOUND.
Dixon Crucible Co., Jos.

PIPE THREADING AND CUTTING MACHINES.
Walraven Co., The.

PLAYGROUND APPARATUS & EQUIPMENT.
Crane Co.
Rundle-Spence Mfg. Co.
Taylor, Halsey W.
Twentieth Century Brass Wks.

PNEUMATIC MACHINERY & TOOLS.
Curtis Pneumatic Mchry. Co.

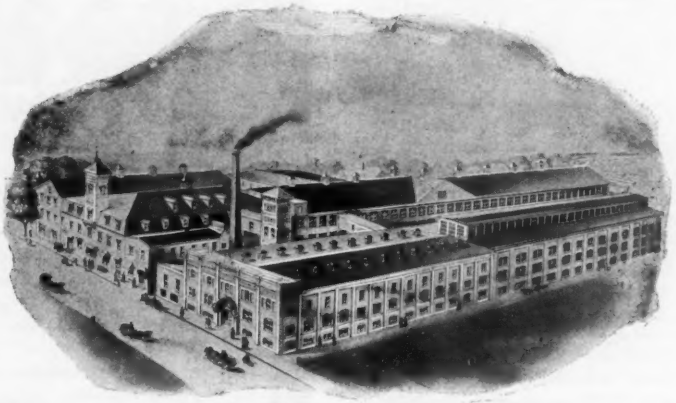
PORTABLE CONVEYORS.
(See Conveyor.)

POSTS—FENCE (WOOD).
Southern Wood Preserving Co.

POWER—ELECTRIC.
Georgia Ry. & Power Co.

POWER TRANSMISSION.
Aldrich Machine Works.
Allis-Chalmers Mfg. Co.
Brown Co., A. & F.
Carlyle-Johnson Mch. Co.
Columbia Novelty Mfg. Co.
Cresson-Morris Co.
Dixon Crucible Co., Jos.
Fabreeka Belting Co.
Fafnir Bearing Co.
Flexible Steel Lacing Co.
General Electric Co.
Hyatt Roller Bearing Co.
Link-Belt Company.
Morse Chain Co.
Skayef Ball Bearing Co.
Transmission Ball Bearing Co.
U. S. Ball Bearing Co.
Walraven Co., The.
Westinghouse Elec. & Mfg. Co.
Williams & Sons, I. B.
Wood's Sons Co., T. B.

PRESERVATIVE PAINT FOR METAL WORK.
(See Paints.)



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PRESSES.
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Butterworth & Sons Co., H. W.
Economy Baler Co.
Famous Mfg. Co.
Phila. Drying Mch. Co.
Proctor & Schwartz, Inc.
Reliance Machine Works.
Smith & Furbush Mach. Co.
Textile Finishing Machinery Co., The.

PRESSURE REGULATORS.
(See Regulators—Pressure.)

PRINTING.
Byrd Printing Co.
Dowman Wilkins Printing Co.
Showalter Printing Co., A. J.

PULLEYS.
Brown Co., A. & F.
Cole Mfg. Co., R. D.
Dodge Sales & Eng. Co.
Cresson-Morris Co.
Link-Belt Company.
Walraven Co., The.
Wood's Sons Co., T. B.

PULLEY COVERING.
Williams & Sons, I. B.

PUMPS.
Allis-Chalmers Mfg. Co.
Bowser & Co., S. F.
Goulds Mfg. Co.
Sydnor Pump & Well Co., Inc.
Toomey, Frank.
U. S. & Cuban Allied Works, Eng'g Corp.
Walraven Co.
Walsh & Weidner Boiler Co., The.
Westinghouse Elec. & Mfg. Co.

PUMPS—OIL.
Bowser & Co., S. F.

PUMP VALVES.
(See Valve Discs.)

PYROMETERS.
Taylor Instrument Co.

QUILL CLEANING MACHINES.
Terrell Machine Co.

RAILWAYS.
Central of Georgia Railroad.
Southern Railway System.

RECEPTACLES—FIBRE.
(See Fibre Products.)

RECORDING INSTRUMENTS.
Foxboro Co., Inc.
General Electric Co.
Powers Regulator Co.
Taylor Instrument Co.

REEDS.
American Supply Co.
Atlanta Harness & Reed Mfg. Co.
Emmons Loom Harness Co.
Shambow Shuttle Co.
Walraven Co.

REELS.
Cocker Mch. & Fdry. Co.
Crompton & Knowes Loom Works.
Draper Corporation.
Gallaudet Aircraft Corporation.
Hunt Machine Co.
Mossberg Pressed Steel Co.
Saco-Lowell Shops.
Schofield Co., Wm.
Whitin Machine Works.

REFLECTORS—LAMP.
(See Lamp Reflectors.)

REGULATORS—LIQUID LEVEL.
Foxboro Co., Inc.
General Electric Co.
Powers Regulator Co.

REGULATORS—PRESSURE.
Foxboro Co., Inc.
General Electric Co.
Powers Regulator Co.
Taylor Instrument Co.

REGULATORS—TEMPERATURE.
(See Temperature Controllers.)

REINFORCING SLAG.
Birmingham Slag Co.

REPAIRING—ELECTRICAL.
Bryan Electric Co.
Curtis, Paul W.
Westinghouse Elec. & Mfg. Co.

REPAIRING—TEXTILE MACHINERY, ETC.
Bird-Potts Co., Inc.
General Machine Works.
Southern Spindle & Flyer Co.
Standard Gas Products Co.

RESTAURANT EQUIPMENT.
Sanymetal Products Co.

RIBBERS.
(See Knitting Machinery.)

RIB TOP CUTTERS.
General Machine Works.
Wildman Mfg. Co.

RING TRAVELERS—STEEL AND BRONZE.
Whitinsville Spinning Ring Co.
Whitin Machine Works.

RINGS—SPINNING.
(See Spinning Rings.)

ROCKER SHAFT BEARINGS.
(See Bearings.)

ROLLS—CALENDER.
Brooks & Doxey, Ltd.
Butterworth & Sons Co., H. W.
Lord Bros.
Roy & Son Co., B. S.
Textile Finishing Mchry. Co.

ROLLS—RUBBER COVERED.
Butterworth & Sons Co., H. W.
Textile Finishing Mchry. Co.

ROLLS—STEEL.
Brooks & Doxey, Ltd.
Butterworth & Sons Co., H. W.
Lord Bros.
Southern Spindle & Flyer Co.
Textile Finishing Mchry. Co.

ROLLER CLOTH.
Philadelphia Felt Co.

ROOFING.
Barrett Co., The.
Cortright Metal Roofing Co.
Southern Wood Preserving Co.
Wadsworth, Howland & Co.
Walraven Co.

ROOF AND CEMENT COATING.
American Cement Paint Co.
Barrett Co.
Du Pont de Nemours & Co., E. I.
Johnson & Co., Inc., Oliver.
Wadsworth, Howland & Co.

ROPE—TRANSMISSION.
Allis-Chalmers Mfg. Co.
Brown Co., A. & F.
Cresson-Morris Co.
Link-Belt Company.
Walraven Co.

ROPE SHEAVES.
Brown Co., A. & F.

ROVING CANS.
(See Cans—Roving.)

ROVING CAN INDICATORS.
O'Malley & Carroll.

ROVING MACHINERY.
Brooks & Doxey, Ltd.
Howard & Bullough.
Lord Bros.
Saco-Lowell Shops.
Whitin Machine Works.

RUBBER GOODS.
Estes Surgical Supply Co.

RUBBER STAMPS.
(See Stamps, Stencils, Etc.)

SALAMANDERS.
Drouve Co., G.

SANITARY PRODUCTS.
Crane Co.
Dixie Culvert & Metal Co.
Estes Surgical Supply Co.
Rundle-Spence Mfg. Co.
Sanitas Co.
Sanymetal Products Co.
Taylor, Halsey W.
Twentieth Century Brass Mfg. Co.
Vogel Co., Jos. A.

SASH-WINDOW—STEEL.
Drouve Co., G.
Lupton's Sons Co., David.
Sanymetal Products Co.

SASH OPERATOR.
Drouve Co., G.

SCALE PREVENTER—BOILER.
(See Boiler Feed Water Purification.)

SCREENS—MOVING PICTURE.
Southern Theatre Equip. Co.

SCREENS AND SIEVES—PERFORATED.
Allis-Chalmers Mfg. Co.
Erdle Perforating Co.
Link-Belt Company.

SCOURING MACHINERY.
(See Washers—Cloth.)

SCRUBBING MACHINE—FLOOR.
American Scrubbing Mch. Co.

SCRUBBING AND WASHING POWDERS.
India Alkali Works.
Mathieson Alkali Works.
Warren Soap Mfg. Co.

SCUTCHERS.
Brooks & Doxey, Ltd.
Lord Bros.
Whitin Machine Works.

SECOND HAND MACHINERY AND SUPPLIES
Bryan Electric Co.
Nashville Industrial Corp.
Toomey, Frank, Inc.
Walraven Co.

SELVAGE HARNESS.
(See Harness.)

SEWING MACHINES.
Merrow Machine Co., The.
Textile Finishing Mchry. Co.

SHADES—ELECTRIC LAMP.
(See Reflectors.)

SHAFTING AND HANGERS.
Allis-Chalmers Mfg. Co.
Brown Co., A & F.
Cresson-Morris Co.
Dodge Sales & Eng. Co.
Fafnir Bearing Co.
Link-Belt Co.
Skayef Ball Bearing Co.
Walraven Co., The.
Wood's Sons Co., T. B.

SHEARS.
Roy & Sons Co., B. S.

SHELVING—SECTIONAL STEEL.
Collins, J. D.
Hyatt Roller Bearing Co.
Lupton's Sons Co., David.
Sanymetal Products Co.

SHINGLES—ASPHALT.
Barrett Co.

SHINGLES—METAL.
Cortright Metal Roofing Co.

SHINGLES—WOOD.
Southern Cypress Mfg. Asso.
Southern Wood Preserving Co.

SHIPPING ROOM MACHINERY AND SUPPLIES.
Atlanta Stamp & Stencil Wks.
Bradley Mfg. Co., A. J.
Collins, J. D.
Hauser-Stander Tank Co.
Hightower Box & Tank Co.
Lewis Co., G. B.
Standard Fibre Co.
Walraven Co., The.
Walke Box Co., Inc.

SHOWER BATHS AND CABINETS.
Crane Co.
Sanymetal Products Co.

SHUTTLES.
Crompton & Knowles Loom Works.
Draper Corporation.
Shambow Shuttle Co.
Southern Bending Co.
Walraven Co.

SICK ROOM SUPPLIES.
Estes Surgical Supply Co.

SIGNS—ELECTRIC.
Federal Electric Co.

SINGEING MACHINERY.
Butterworth & Sons Co., H. W.
Phila. Drying Machine Co.
Textile Finishing Machinery Co., The.

SIREN.
Brown Co., A. & F.
Federal Electric Co.

SITES FOR FACTORIES.
(See Industrial Sites.)

SIZE BOX TEMPERATURE CONTROLLER.
Foxboro Co.
Powers Regulator Co.

SIZE KETTLES.
Butterworth & Sons Co., H. W.
Hauser-Stander Tank Co.
Howard & Bullough American Machine Co.
Lombard Iron Wks. & Sup. Co.
Saco-Lowell Shops.
Textile Finishing Machinery Co., The.

SIZING AND FINISHING COMPOUNDS.
(See Finishing and Sizing Materials.)

SKEWERS.
Jordan Mfg. Co.

SKYLIGHTS.
Drouve Co., G.
Lupton's Sons Co., David.

SKYLIGHT GUARDS.
Knapp Fence Co.

SLAG FOR CONCRETE.
Birmingham Slag Co.

SLASHERS AND SLASHER ROOM SUPPLIES.
Butterworth & Sons Co., H. W.
Cocker Mch. & Fdry. Co.
Cole Mfg. Co., R. D.
Howard & Bullough.
Pickens Slasher Hood Co., R. O.
Saco-Lowell Shops.
Textile Finishing Machinery Co., The.

SLASHER CLOTH.
Philadelphia Felt Co.

SLASHER HOODS.
Cole Mfg Co., R. D.
Pickens Slasher Hood Co.

SLASHER TAPE.
(See Tape—Slasher.)

SLATE ASPHALT ROOFING.
Barrett Co.

SLIDING PARTITION HARDWARE.
Lupton's Sons Co., David.
Sanymetal Products Co.

SLUBBERS.
Brooks & Doxey, Ltd.
Howard & Bullough.
Lord Bros.
Saco-Lowell Shops.
Whitin Machine Works.

SOAP—TEXTILE.
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Du Pont de Nemours & Co., E. I.
Electric Smelting & Aluminum Co.
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Klipstein & Co., A.
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Newport Chemical Works.
Sonneborn Sons, Inc., L.
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United Chemical Products Corp.
Warren Soap Mfg. Co.
Wolf & Co., Jacques.

SODA—TEXTILE. SODA ASH AND BOILING.
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Amer. Yarn & Processing Co.
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Arlington Cotton Mills.
Arrow Mills, Inc.
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Flint Mfg. Co.
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Florsheim, H. A.
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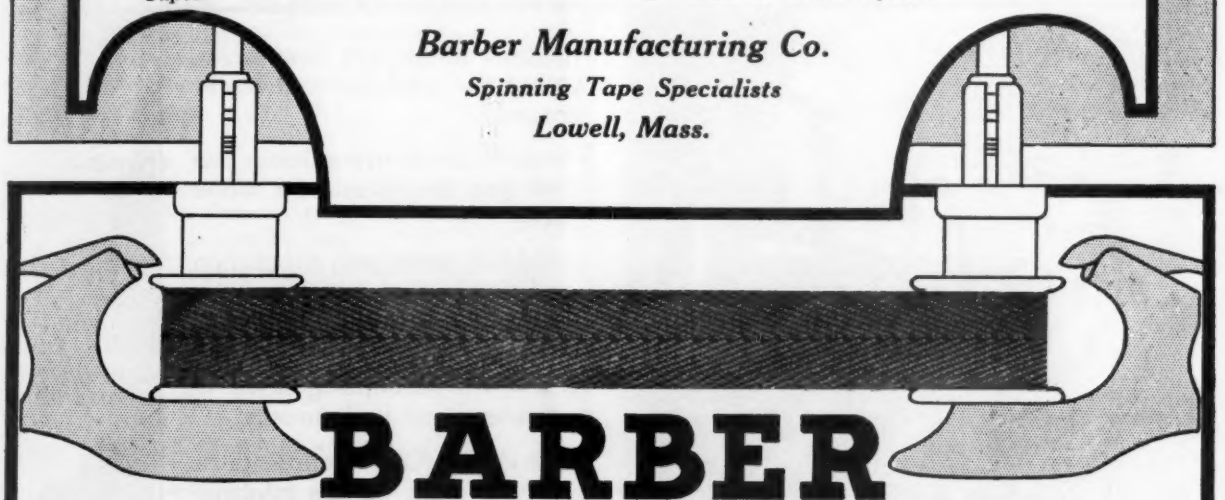

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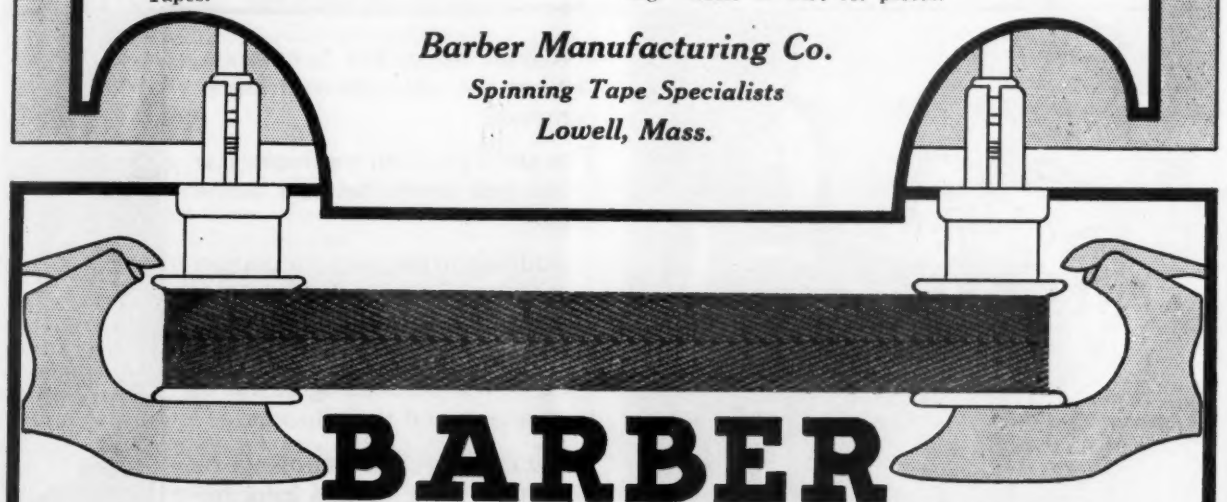

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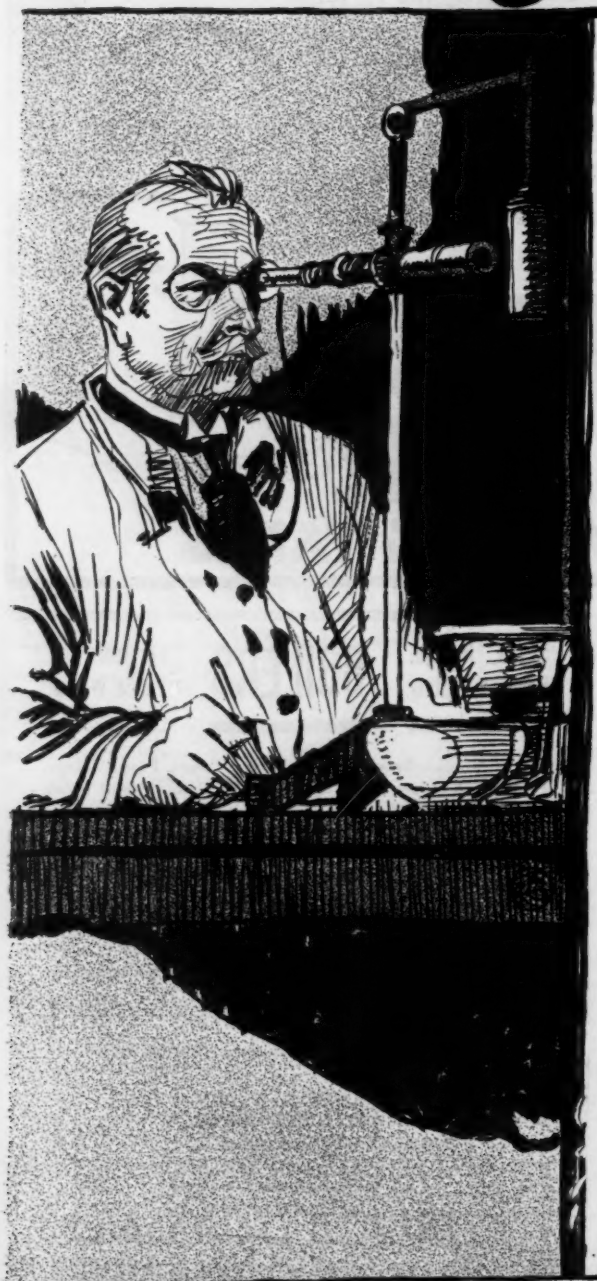

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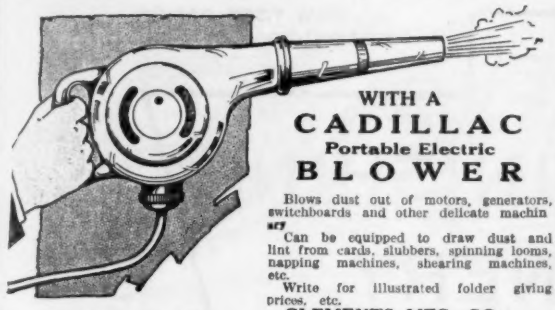

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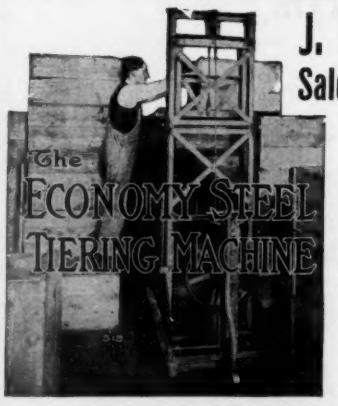

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THE TEXTILE-FINISHING MACHINERY CO

CANADIAN REPRESENTATIVES
WHITEHEAD, EMMANS, LTD.
MONTREAL

SOUTHERN REPRESENTATIVE
H. G. MAYER
CHARLOTTE, N. C.

Your Inquiries Solicited for

MACHINERY

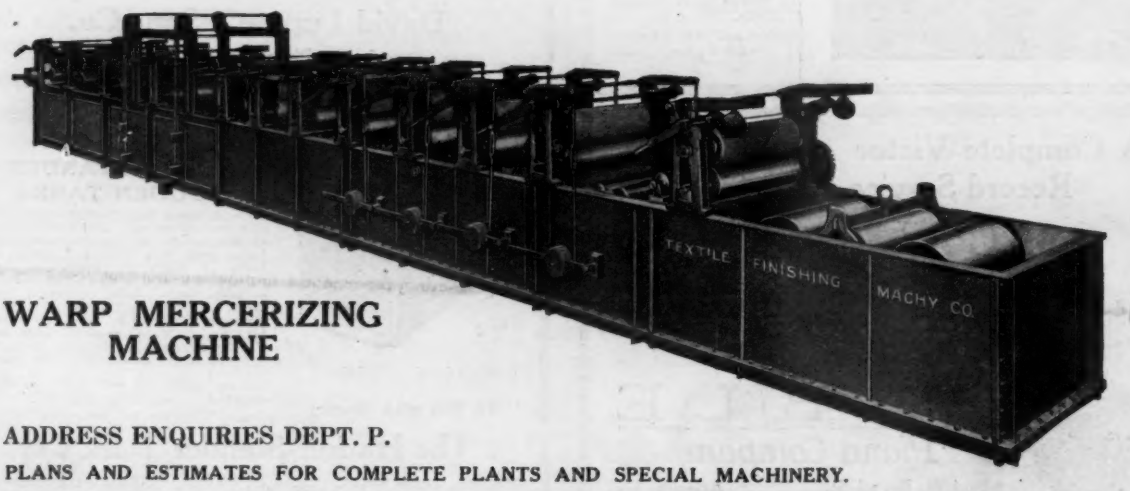
of All Kinds and Types for Bleaching, Dyeing, Drying

Mercerizing and Finishing Piece Goods and Warps

—o—

Our Specialties Are:

Upright and Horizontal Dryers, Warp Mercerizing Machines, Singers, Kiers, Washers, Squeezers, Scutchers, Dye Jiggs, Mangles, Calenders, Tenters, Color and Size Kettles, Warp Dyeing Machinery, Elastic Web and Narrow Fabric Finishing Machinery, and Calender Rolls of Cotton, Husk, Paper and Patent Combination Stock.



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PLANS AND ESTIMATES FOR COMPLETE PLANTS AND SPECIAL MACHINERY.

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Southern

ICE AND REFRIGERATING MACHINES

A Dividend Paying Investment for Any Textile Mill or Finishing Plant and Village

This compact and efficient refrigerating and ice-making system is being used in quite a number of mills and finishing plants, and each installation has proved to be a dividend paying investment.

Some plants use it solely for making ice for use in the mill water fountains, hospitals and for sale to operatives. These plants have found that ice can be made with a "Southern" equipment at a fraction of what it formerly cost them to buy ice from other sources.

Some use it as a small refrigerating plant for cooling and conserving food supplies such as milk, butter, meats, etc., for the community stores and markets. It means better sanitation, purer food supply and more healthful and efficient operatives, not to speak of the saving in food supply.

Some use it for cooling the different chemicals used in the finishing and processing of their goods, in the dye house and finishing plant, and secure much better and more uniform results at a great saving over the use of ice.

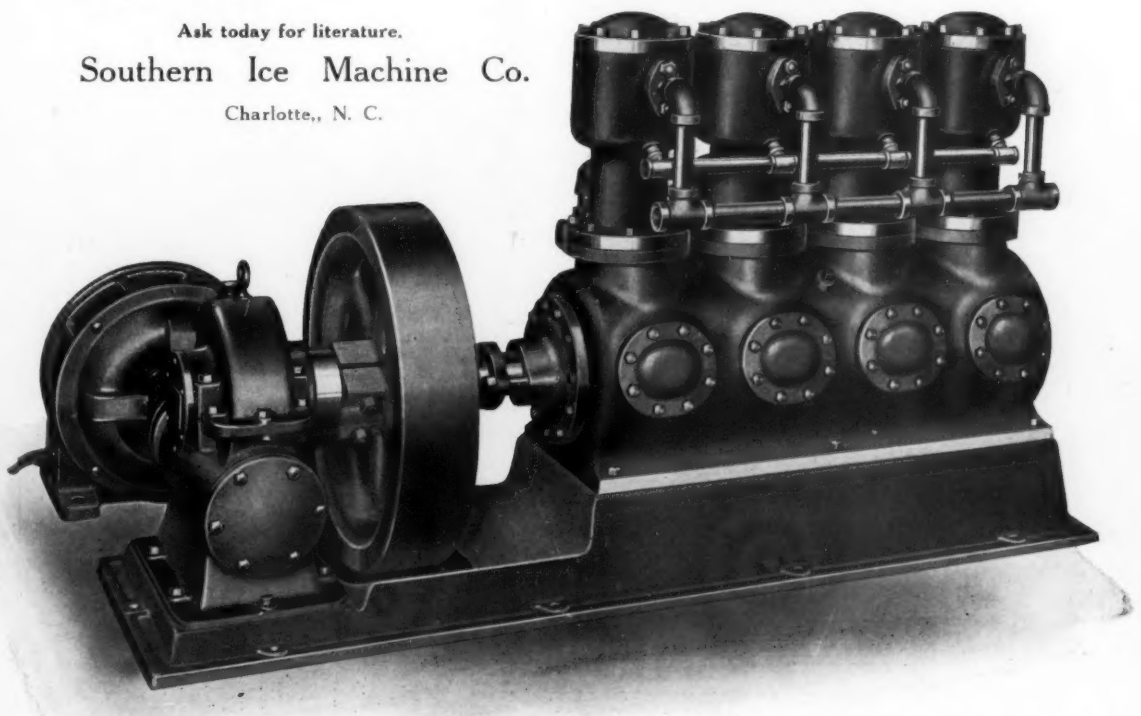
And some use it for a combined purpose of making ice and as a refrigerating plant.

Our experts are at your service, without obligation, and will be glad to show you just what a "Southern" equipment can do for you, what it would cost you, and what it will save you in actual dollars and cents.

Ask today for literature.

Southern Ice Machine Co.

Charlotte,, N. C.



1 to 6 Ton Capacities

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PULLEYS

Buy *all* kinds of pulleys from Dodge

The first Dodge Wood Split Pulley was offered to the trade over forty years ago. Since that time, over five million have been sold on a guaranteed service basis. Millions of dollars have been saved to power users by their use. Not only is the tractive pull of a leather belt on wood greater than on metal, thereby reducing belt slippage with a resulting power saving, but these pulleys while 40 to 80% lighter than metal will operate safely and successfully at any practicable rim speed and under double belt service.

Dodge Iron Center Wood Rim Pulleys are adapted for high speeds and severe service. They will sucessfully withstand shock loads, reduce belt slippage and run true without vibration.

One million Dodge Standard Split Iron Pulleys have been sold since their introduction in 1900. They are adapted for service under severe and unusual conditions and in places where the use of wood pulleys would be impracticable. These pulleys are molded from metal patterns, cast of the highest grade iron, accurately faced on rim and lacquered. These careful methods assure perfect balance and running truth. Split construction obtained by fracturing the rim affords easy installation and when installed and draw bolts tightened the result is a perfect joint.

Dodge-Keystone and Dodge-Oneida Steel Split Pulleys combine lightness with ample strength to withstand the heaviest service. The grooveless oval crown provides a perfect contact surface for the belt, permits operation under low tension, reduces bearing friction, saves power.

National Steel Pulleys in diameters from 3 inches to 5 inches and faces from 3 inches to 5 inches satisfy the demand for a small well balanced pulley suitable for motors, dynamos, machine tools, etc.

You can buy Dodge wood, iron or steel pulleys from Dodge, Oneida and Keystone dealers in your city on an immediate delivery basis. The first order for any quantity will prove the value of Dodge quality and service —a "first order" will undoubtedly lead to complete standardization with Dodge power transmission products. This invariably means low first cost, minimum upkeep and increased continuous production.

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